ORIGINS

The Journal of The Biblical Creation Society

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1999

Geochronology
– new light on the past?

Genealogy is NOT Chronology

Inquest on the Death of Adam

Big Questions for Evolutionists

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Contents

Page

Editorial — J. H. John Peet — 1
Creation in the News — 2
Geochronology in the Light — Ian C. Fuller — 6
Green Islands — Joachim Scheven — 8
The Death of Adam Revisited — Philip Duce — 10

News of Creation

International Conference on Creationism 1988 — Ewan More — 13
Genealogy is not Chronology — Steven J. Robinson — 15
Correspondence — 22
Reader's Viewpoint — Richard H. Johnston — 25

Reviews

From Flood to Pharoah — Paul Garner & J. H. John Peet — 27
A Drama of Creation — J. H. John Peet — 30
Eight Questions for the Christian Evolutionist — J. H. John Peet — 31

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Editorial

THE *Biblical Creation Society* has as its aims

- **the advancement and defence of the biblical teaching on creation**
- **research for a coherent biblical and scientific viewpoint**
- **a challenge to fellow Christians who have accepted holistic evolutionary views.**

Such a programme has meant that often the past issues of *Origins* have been rather technical. We do recognise, however, that some of our readers are new to the creationist scene and need to have an introduction to our position.

To this end, the next issue of *Origins* will be a 'back to basics' one. We will seek to cover the main areas of debate in short and lucid articles. We have approached a variety of specialists to provide us with material. Therefore, it will be an issue that should be suitable to pass on to christian friends who are not sure of the issues and are seeking clarification. Please pray for the writers and editors as we put this special edition together.

There has been a significant growth in creationist groups around the country. We have heard of several in the north and we are seeking to share in these as far as possible. Ewan More, in this issue, reports on the ICC meetings in America in 1998. He asks if there are more creationists in the Edinburgh area who would like to form a local group. If you are interested, write to him c/o our administrative officer.

The committee have plenty of ideas for the development of the work of the society. There are two needs: time for busy workers and the finance. We believe that there is a need for the production of technical monographs. (We allude to one in the article on the eye). We would like to produce a journal suitable for teenagers of similar quality to *Origins*. Then we are always being asked about the production of material for young children. There is a need for British-based material. We are grateful for the books, *etc.* available from overseas, but there is a need for something suitable to the British culture. These are some of the challenges that face us. Please pray. Maybe your church would like to recognise our work as a part of their missionary challenge?

Some folk think that the Creation issues are about the past and of no relevance to today or the future. However, when we read Scripture, we are forced to recognise that it is very relevant to this modern world. To take the Flood, for example, we see how the Lord highlighted its significance: 'As it was in the days of Noah, so it will be at the coming of the Son of Man. For in the days before the Flood, people were eating and drinking, marrying and giving in marriage, up to the day that Noah entered the ark ... That is how it will be at the coming of the Son of Man' (Luke 17:26–27).

As in all biblical exposition, we must be clear as to what the Bible says. If we read this superficially, we might well argue that there will be a final devastating Flood at the judgment; after all, that was 'as it was in the days of Noah.' Peter, of course, makes it clear that that it is not the case (2 Peter 3:6–7). The final destruction will be by fire.

What is apparent from our Lord's comments is that men and women were going about their normal daily routines, obsessed by material things. Contrast the rich (poor?) fool in Luke 12:13–21. Peter also makes it plain that the people of the last days will be scoffers (v.4). When we look back at Genesis 6, we see the matters that disturbed our God. There were illegitimate relationships and there was violence.

Certainly, as we see the uncertainty of life through earthquakes, wars and other disasters, we are to take note of the shortage of the time. But it is man's disobedience, carelessness and anti-God behaviour that mark him out for judgment. Is that not a picture of our day? The Flood reminds us that a day of judgment is coming. It is plain from these Scriptures that, just as the Flood was universal, so will the final judgment be. Once we downplay the Flood, we cast doubts on the final judgment.

Again, we see how God spared Noah and his family (1 Peter 3:20) and through the safety of the ark—designed by God—they were saved. So, through the death of Christ, the righteous will be saved from that final judgment. The issues are crucial. So, let us continue to expound the Scriptures on these critical issues. Genesis 1–11 is fundamental to our salvation.

J.H.J.P.

An Editorial Comment

Articles published in *Origins* cover a wide range of issues associated with our theme of biblical Creation. We allow some latitude to our authors within certain guidelines. Doctrinally, authors have to subscribe to our *Basis of Faith*. Articles also have to conform to our *Creation Manifesto*. This makes it plain that we accept that the biblical teaching is of a young earth (*i.e.* measured in thousands of years not billions) and a six day Creation, based on natural days. We keep hearing rumours that we do not accept these positions, so we would like to take this opportunity to clarify and confirm our position. As was made plain in our recent series on chronology, there is some uncertainty on detailed dates, *etc.*, but the Bible does not allow for an unlimited expansion of the time-scale. In the spirit of research, we are happy to allow our authors space to explore and debate their preferred positions.

Creation in the News

Dawkins's Blind Spot

J. H. John Peet

I RECENTLY had a letter from a young Christian evolutionist, who used, as a strong argument against Special Creation, the faulty design of the human eye. He wrote, 'The design of the eye is itself far from perfect—all the nerves from the retinal cells go the wrong way, blocking out some of the light and creating a blind spot in the retina where they pass through to the optic nerve. This is not functionally necessary (and is actually slightly wrong) but is simply baggage carried over from the vertebrate eye's evolutionary background. The octopus, whose eyes evolved separately (but convergently) has its retinal nerves going out the back.'

Sadly this young man learns his criticisms from Professor Richard Dawkins (1986). Dr. Marshall, an ophthalmologist, says that his view 'comes from a lack of knowledge of eye function and anatomy.'

To understand the arguments we will begin with a discussion of the structure of the eye. Several years ago, Sylvia Baker wrote a fascinating series of articles on the eye (1991–2). (We are hoping to be able to produce these as a separate booklet when funds allow). I strongly recommend that these are read, but we will concentrate on the above criticism.

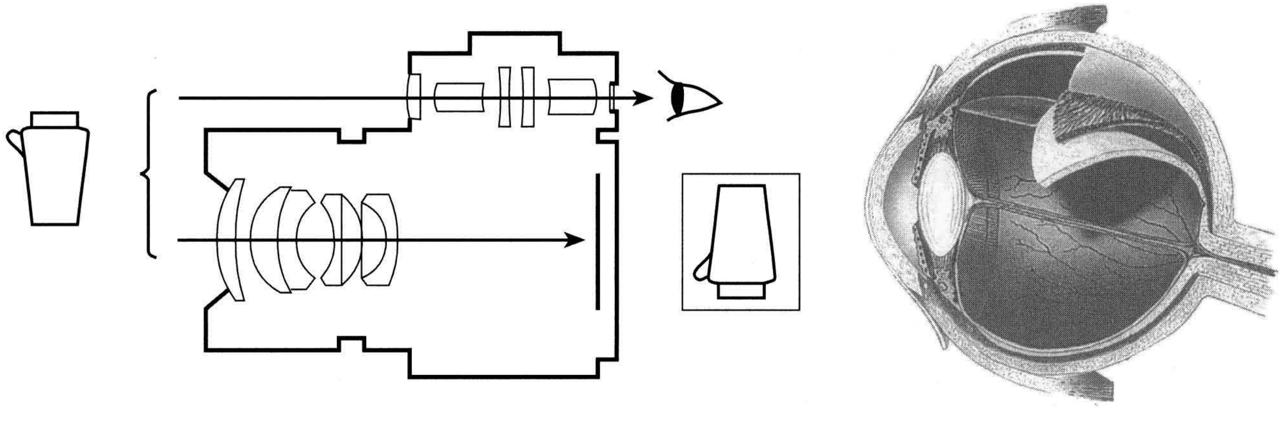


Figure 1. Comparison of the structure of a camera and an eye

Often in elementary science lessons the eye is compared to a simple camera (Figure 1). It has an aperture to allow for the entrance of light, a lens which focuses the light onto the back of the camera across which passes a light sensitive film. (Of course, even then the camera does not 'see' the scene: it has to be seen by the eye and the brain!) This is a useful illustration, though a grossly simplified description of the working of the eye. The film corresponds to the light sensitive rear of the eye ball: the retina. The film is itself fairly complex with various chemicals in several layers that respond to the varying colours of the light. So it is with the retina (Figure 2). But there the similarity ends.

The incoming light first passes through the cornea. The iris controls the amount of light passing into the eye and on to the retina. The retina is virtually transparent to visible light though ultraviolet radiation (to which the retina is not sensitive) is filtered by the thin tissue of the auxiliary cells.

Passing through the retina, the incident light first encounters the axons leading to the central nervous system (CNS). These lead to the 'blind spot' where they combine to form the optic nerve. As will be apparent from subsequent discussion, this is a blind spot because there are inevitably no light detectors at this point. Pause and think of the design aspects here. There is a blind spot in each eye, but they are displaced laterally with respect to each other so that what is not seen by one eye is viewed by the other; the eyes compensate for each other in this respect.

I am working on a computer screen which has approximately half a million *pixels*, that is, light sensitive spots. Each of those has to be 'wired' into the central

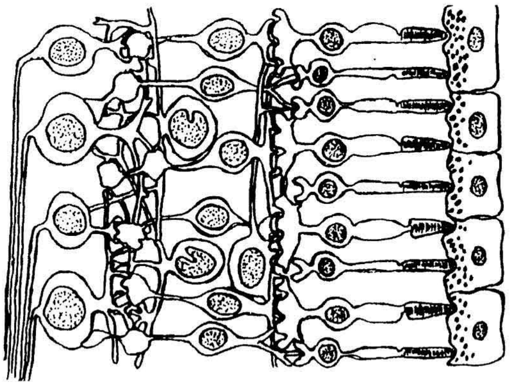


Figure 2: Functional parts of the retina

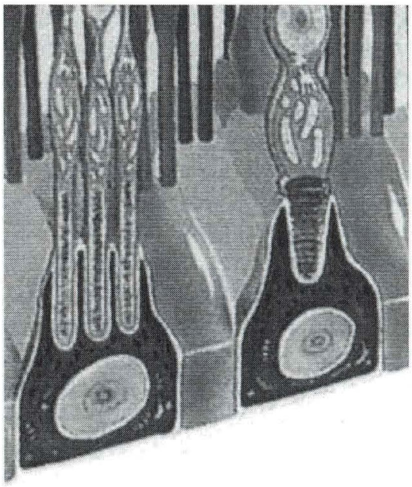


Figure 3: Intercalation of photo receptors with retinal pigment epithalium

computer system so that they may be independently activated to give the complete picture. (What a good job this did not have to happen by random chance processes!) That needs expert design and electronic engineering skills. In contrast, the retina has approximately 250 million light sensitive cells and each of these is 'wired' into the central nervous system.

The light will then pass through a layer of auxiliary cells (bipolar, ganglion and amacrine cells) which connect the photoreceptors to the optic nerve. For our purposes, we will ignore the detailed function of these cells and pass on to the receptors themselves. The photosensitive layer is made up of two types of cells: the rods and cones, so named after their shape. These cells convert the light energy into an electrical signal which is passed on to the optic nerve. The light sensitive end of the photoreceptors points away from the light source and is in contact with the *retinal pigment epithelium* (RPE).

The box summarises the chemistry of the process of vision that occurs in the photoreceptors. It is a complex process which occurs in the retina (see Behe, 1996). This process also speaks of design. Each photon of light (the technical term for the basic unit of light energy) causes a change in one molecule of retinal (see box). Since there are billions of photons striking the eye continuously, there will be a correspondingly large number of molecules destroyed and needing to be replaced. This is the function of the RPE. The cells of this layer collect the used retinal and, using vitamin A, convert the chemical back to its active form which is transferred back to the rods and cones.

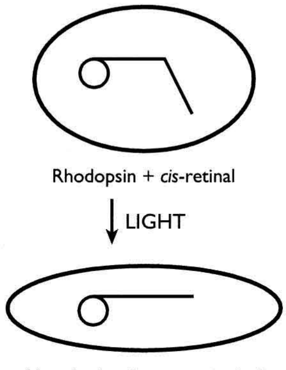
For this process to occur efficiently, there must be good contact between the distal end (the extremity closest to the RPE) of the photoreceptors and the retinal pigment epithelium. This is achieved by the rods and cones being embedded in the RPE (Figure 3)

The membranes at the ends of the rods and cones need replacement too. As new membranes are grown, the old are shed. These are 'digested' by the RPE and provide chemicals that can be recycled. Because of the high level of metabolic activity required in the RPE for these regeneration processes, it is supplied with a very rich blood supply from the adjacent *choroid* layer.

Now we can identify why the eye is 'wired' this way round. If the reverse situation existed, the RPE would be inner most and out of contact with the choroid layer. If the choroid layer was also on the inside, it would stop all light reaching the photoreceptor cells because of the rich blood

From Light to Chemicals to Electrical Pulses

The Chemistry of Vision



The process by which a light signal is converted to an electrical impulse and so interpreted by the brain is complex. This account is a grossly simplified description!

The chemicals that interact with the light are rhodopsin and *cis*-retinal. This chemical package can be illustrated as in the first figure by a bent chemical (the *cis*-retinal) trapped inside the rhodopsin. When a photon of light (the fundamental unit of light) strikes the retinal molecule, it undergoes a structural change, giving *trans*-retinal. The result of this is that the rhodopsin also has to change shape, and becomes metarhodopsin.

This new package then reacts with another chemical pair, transducin-GDP, to give another activated chemical grouping. It is this new grouping which interacts with the cell membrane to release a flow of charge across the membrane. This is achieved because some chemicals are electrically charged (*ions*). That charge is then passed along the nerves to the brain.

Enzyme action causes the regeneration of the *cis*-retinal so that further light signals can be detected and communicated.

supply it carries. This is equivalent to the situation in which someone suffers from a hæmorrhage on their retina and consequently they lose their sight.

Clearly the eye is ‘wired’ the right way round! But does that mean the cephalopods are wired the wrong way round instead? Again, the answer is ‘No.’ They are different creatures, living in different circumstances and with different needs.

In this family of the squids, vision is at shorter wavelengths, around 300nm (in contrast to the human vision at 400–700nm). They are viewing at ultraviolet wavelengths, but this is through an aqueous medium. Water acts as a filter and so the light is of lower intensity. As a result, the squids need to receive the maximum intensity on the retina and the inverse arrangement is needed. Their eyes are not exposed to direct sunlight and so they do not need the protection required by human beings, but they do need the inverse arrangement.

This, of course, is a real problem for the evolutionists. Eyes are such specialised organs that it is difficult to conceive a mechanism by which one specialised organ can change into another equally highly specialised without going through less efficient stages. The latter should, under evolutionary principles, be eliminated before new ones could develop. As Dawkins himself wrote, ‘Unlike human designers, natural selection can’t go downhill, not even if there is a tempting higher hill on the other side of the valley.’) Another example of the contrasting needs can be seen in flies and humans. The key factor for flies is to be able to detect objects quickly because of the speed at which they move. They see at frequencies of 200Hz. Human beings do not need to react so rapidly, but we do need greater resolution, so our frequency of vision is 10Hz. Of course, what we see with our eyes has to be interpreted by our brain into a meaningful picture. Someone has calculated that, when we enter a room, the observations we make and that are programmed at the very instant are equivalent to 12 modern supercomputers!

This introduces us to another of Richard Dawkins claims (1994; 1995). He believes that the problem of the evolution of the eye has been resolved! He refers to the work of Nilsson and Pelger (1994). They worked at the level of tissue deformations, not cellular biophysics (problem 1). They also took the existence of the light-sensitive cell as given (problem 2). According to Dawkins, the popular scepticism about eye evolution centres on the tissue issue. Not in my book!

By comparison with processes generating other anatomical changes, the researchers developed a computer simulation of the way in which the eye could be deformed from a simple planar structure to the modern globe. (Problem 3—there is a difference between a computer simulation program written by an intelligent being towards a specific end and random, blind mutations!). Their simulation achieves the required result in a little over 1,800 steps. (Problem 4—we know from experience that most mutations are detrimental. What about programming in the right proportion of detrimental changes?). From this, they estimate that the eye could evolve through these stages within half a million generations.

Add to these the complexities of the real eye (the wiring, the brain, *etc.*) and one has to say that Richard Dawkins has no idea! We are reminded of the words of the Psalmist (94:9): ‘He that planted the ear, shall He not hear? He that formed the eye, shall He not see?’

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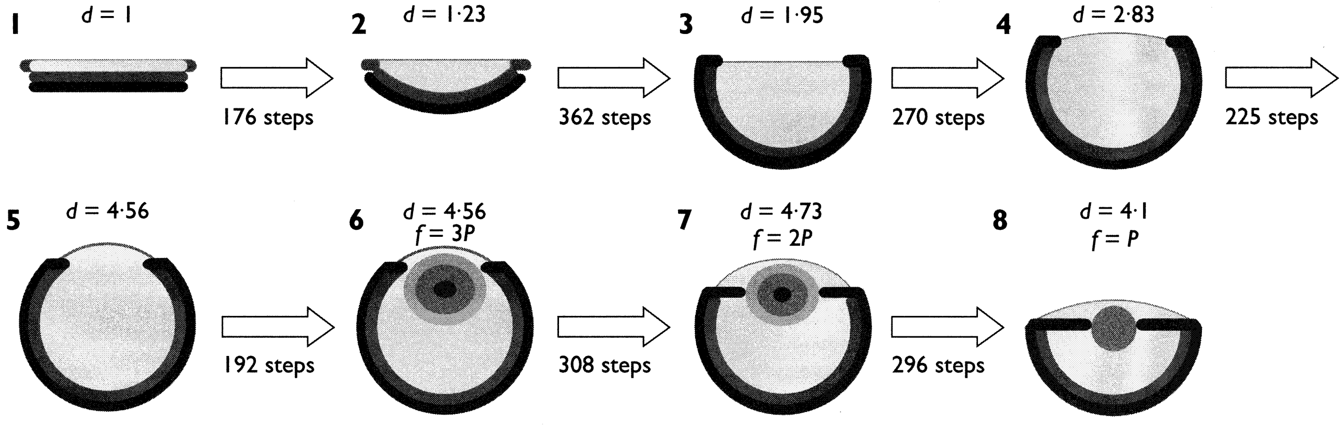

Figure 4. Computer simulation of the possible development of the eye, after Nilsson and Pelger

Some Updates on Previous Articles and News

The speed of light—it may have changed after all!

Creationists have often been perplexed by the problem of how light could travel to the earth from the stars in a few thousand years. Several solutions have been proposed, most recently the papers by Setterfield and by Humphreys. Barry Setterfield proposed that the speed of light has been decreasing since creation (from an initial high value). His work has been criticised in this journal and others, particularly on the basis of his use of statistics. However, as we have said, we do not reject the idea as such, even though it presents several practical problems, especially if the value was significantly higher during man's time on the earth (that is, from day 6 of Creation).

A few non-christian scientists have come up with similar proposals over the years, but it has been given a new impetus by doctors Joao Magueijo (London) and Andreas Albrecht (California). They have proposed in a leading physics journal that the speed of light 10–15 billion years ago may have been 10^{70} times the current value.

This is not that they are turning creationist, but they see it as an important explanation of certain problems in the Big Bang theory of the origin of the universe.

Ice Man

Oetzi, the Ice Man found in the Alps in 1992, still intrigues scientists and research continues on his remains. His hair has been examined to determine something of his diet and the conclusion is that it was lacking in meat and dairy products. Of course, living under such harsh conditions of ice and snow, this is probably not surprising.

It was observed on his discovery that he had a number of tattoos. These have been explored further. He suffered from arthritic joints at his knees and ankles. It was in these regions that the tattoos were found. It appears that they were formed as a result of treatment for the arthritis to dull the pain of the disease. The skin was cut around these joints and herbs were packed in and burnt.

Neanderthal Man

Recently there has been further debate about the origin of his distinctive physical features. One researcher, a geographer, has suggested that these deformities were the result of an iodine-deficient diet. He has concluded that they were anatomically modern humans but suffered pathological problems including cretinism! Not surprisingly, this work has brought a lot of controversy, but it does illustrate that the case for evolution of man, at least *via* Neanderthal Man, is far from proven. Increasingly he is being described as *Homo sapiens* suffering from disease or some dietary deficiency.

Dr. Cuozzo was interviewed on Cornerstone Television in America and he described his own research in this area. He compared Neanderthal Man with ageing modern man. He measured head sizes in people at different ages and found that there were noticeable changes with time. He documented that the brow ridge moved forward, the jaw came forward, the nose got bigger, the back of the head started to point out, *etc*. He concluded that if we lived to the ages of the early patriarchs such as Noah, then we would have distinctly Neanderthal features.

It was reported in *New Scientist* (May 2, 1998, p.23) that the hypoglossal nerve which enables us to speak by controlling the complex tongue movements, was the same size in Neanderthal Man as in modern man and completely different from that in apes. Clearly he was as able to talk as we are.

Another example of the way evolutionists are catching up on creationists is given in *New Scientist* (6 February 1999, p.23). At the meetings of the American Association for the Advancement of Science, Prof. Christopher Ruff reported on studies he had done on the bones of Neanderthal man and his contemporaries. He concludes that there was little difference between the robustness of their bones and those of *Homo sapiens*. He thinks their stockier build may have been solely an adaptation to living in a cold climate. (I guess many creationist speakers, like myself, have been saying that for years!) Prof. Ruff concludes that there would have been little behavioural difference between them and us.

Moon rock

Much research continues in the desire to find evidence of life on Mars. Billions more dollars have been allocated to this futile work. (One cannot help but wonder about the benefits that would result if this money were made available to help the needy on this planet where life *is* known!).

Last year a conference was held at Houston (at the Lunar and Planetary Institute). It was reported that over a million pounds sterling had been spent investigating the famous meteorite, ALH84001. The result? NASA scientists have concluded that the case for life on Mars is shakier than ever! A number of lines of supposed evidence have vanished with further research.

Apes 98% man?

The latest daft proposal, presumably from a New Ager, is that apes be given human rights because they are 98.4% human. We have shown before that this is misleading. Now *New Scientist* (11 February 1999, p.3) has joined the fray. 'This misses the point: genomes are not cake recipes. A few tiny changes in a handful of genes controlling the development of the cortex could easily have a disproportionate impact. A creature that shares 98.4 per cent of its DNA with humans is not 98.4 per cent human, any more than a fish that shares, say, 40 per cent of its DNA with us is 40 per cent human.'

Geochronology in the Light

Luminescence Dating: A Critical Review of a New Technique

Ian C. Fuller

I RECENTLY found myself in the unusual position of working in the field of geochronology, seeking to establish radiometric age estimates of river deposits for a doctoral thesis, whilst subsequently, by the grace of God, becoming convinced of a six day creation, young Earth and a global Flood. As such, this provided me with a rare opportunity for a specialist assessment of a developing dating technique in the light of biblical truth. In order for objective scientists to stay well-informed of new techniques, this résumé has been put together.

At the outset, it must be asserted that the word 'date' or 'age' is a misnomer. All good geochronologists are aware of the limitations of their techniques, consequently the numbers produced are, within the field, referred to as 'age estimates' and never as absolute. Unfortunately over-zealous geologists and the media take these numbers as absolute and (almost) without error, leading to the citation of age estimates as 'dates.' Geochronology, however, is a very inexact science.

Luminescence dating is a recent development in the broader field of geochronology which is applied to sediments of Late Quaternary origin (the Quaternary is the most recent part of the geological column, the Late Quaternary is the period of time preceding, during and following the last ice age, geologically speaking the last 130,000 years). It differs from radiocarbon and uranium series methods in being applied to sediment grains, usually quartz or potassium feldspars, rather than secondary precipitates or organic matter. The technique relies upon the resetting of the luminescence signal by light (when applied to sediments) or heat (when applied to pottery). In order for the reader to grasp the concepts involved in this technique, a simplified overview of the fundamental principles is outlined below.

Basic principles

When a mineral is formed by crystallisation from magma, its crystals will contain impurity atoms and other defects. Some defects are attractive to free electrons which are produced in abundance by nuclear decay of radioactive elements, notably uranium, thorium and potassium–40. Electrons thus become trapped within the defects in the crystal. As time passes, so more electrons are trapped. Defects/traps may be emptied of electrons by exposure to light (bleaching) or heating (at temperatures >300°C), at which point zeroing is said to have occurred, *i.e.* the luminescence signal, which is a product of the trapped electrons and described below, is set to zero. Luminescence techniques attempt to obtain a measure of the number of electrons that have accumulated over time in the lattice defects since the last exposure of the sediment to light (or pottery to heat)—*i.e.* the last zeroing event. Artificial exposure of the sediment grain to light (optically stimulated luminescence [OSL]) or heat (thermoluminescence [TL]) will release a portion of the trapped electrons. As electrons are released, some of them will combine at specialised defects / traps in the lattice known as luminescence centres (Aitken, 1985), such combinations release a photon of light per combination. The number of photons given off following exposure to light (OSL, see Aitken, 1992) or heat (TL, see Aitken, 1985) is detected in luminescence dating, with the principle being that the more light detected, the more electrons trapped, the larger the palæodose (amount of radiation received over time), thus the older the zeroing event (deposition of sediment or firing of pottery).

Luminescence age calculation

Luminescence age is calculated by the following formula:

$$\text{luminescence age} = \frac{\text{palæodose (Gy)}}{\text{dose rate (Gy/ka)}}$$

The palæodose, *i.e.* the amount of radiation received by the sediment over time, is measured by detecting light emissions following luminescence stimulation (described above). This is measured from the natural sample of sediment and subsequently on a sample of the same sediment which is dosed by a known amount of radiation, measured in grays (Gy). This is repeated, increasing the dose successively 4 to 5 times, producing a curve which shows the increase in luminescence signal with dose (Figure 1). The curve is then extrapolated back to the intersection with the x axis (zero luminescence signal) to define the palæodose of the sediment.

The dose rate, *i.e.* the rate at which the palæodose accumulated or the rate at which the sediment received radiation over time is then calculated, usually on the basis of grays per thousand years (ka). This is established by measuring the radioactivity of the modern sample, achieved by measuring the products of radioactive decay, *i.e.* β and γ emissions, together with the U, Th and K contents. The more radioactive elements in the sample, the greater will be these emissions, thus the higher will be the dose rate. Dividing the palæodose by this dose rate therefore gives an estimation of age.

Thus a high palæodose/large emission of light from a natural sample will be expected either where the sample is deemed 'old' or where it is more recent, but the dose rate is high. For the same palæodose, the higher the dose rate, the younger the sample.

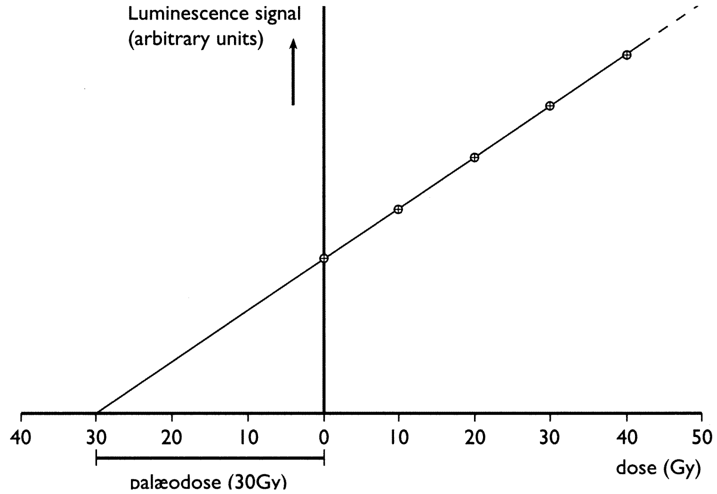

Figure 1: Construction of a growth curve using the luminescence signal of irradiated samples (10 to 40 Gy) and the natural sample (0 Gy). A best fit curve is constructed between these points and extrapolated to the x axis, in this case giving a palæodose of 30 Gy. The graph is entirely illustrative.

Limitations and assumptions

What we need to know when presented with luminescence ages in the scientific literature and via the media is what they actually represent. As the computation of any luminescence age is a two-stage process (palæodose and dose rate calculations), there is plenty of room for error, such that even within the geochronology fraternity, age estimates with a 10% error each way are common place and accepted. Any luminescence age is really a statement of statistical probability, purely resulting from the way it is calculated and the number of components which go into establishing it, which may be illustrated by listing the stages in determining dose rate:

1. Measurement of a dose rate based on U and Th content measured using thick source alpha counting.
2. Measurement of β dose rate using thick source beta counting (Sanderson, 1988).
3. Measurement of 40K (where grains of potassium are being measured) using geochemical determinations *e.g.* ICP-MS or AAS).
4. Measurement of γ ray contribution.
5. Estimation of cosmic ray contribution, based on depth of sample (assumed constant) (Prescott & Hutton, 1988).
6. Measurement of water content of the modern sample and an estimation of the most likely content in the past (water also attenuates radiation in the sediment body, the more water the greater the attenuation).
7. Measurement of sediment grain size (this attenuates radioactivity in the sediment grain—the larger the size, the greater the attenuation).
8. Estimation of alpha efficiency value (based on grain size and mineralogy) (Mejdahl, 1987).

Each of these stages of measurement introduces error into the procedure, which accumulate as they are put together as a dose rate and luminescence age. Consequently luminescence dating can only be a statement of probability, never of fact, even if the numbers are accepted and acceptation of the numbers even then may not be warranted.

Additionally, there are a number of limitations which question the whole basis of the technique and which may explain why, in a young Earth, ages >100,000 years are being obtained:

1. Complete zeroing of sediments at time of deposition is assumed, but often incorrectly. Experiments using sediments from a variety of sediment environments (æolian (Wintle, 1993), marine (Balescu & Lamothe, 1994), fluvial (Fuller *et al.*, 1994), glacial (Duller, 1994)) have demonstrated the existence of a residual luminescence signal—*i.e.* no matter how much the sample is exposed to natural light conditions, there always remains a residual number of electrons. The size of this residual is variable according to sample and the precise method of measurement used. The larger the residual signal, the greater the overestimation of luminescence age. Attempts have been made to correct for the residual level, but in reality it is impossible to determine.
2. A constant U, Th and K content is assumed over time. However uranium is soluble and may be leached away if water flows through sediments, either as infiltrating rainfall or percolating groundwater. If there has been substantial leaching of uranium, the dose rate measured in the laboratory will underestimate the real dose rate over time, resulting in an overestimation of age. This is a major limitation as the water content of any sediment body will have varied over time and water will have percolated through virtually every sediment body at some stage.
3. Sample preparation may create spurious luminescence—sediment samples usually require disaggregation, involving crushing and grinding with a pestle and

mortar, but such activity may result in additional luminescence signal when measured, leading to overestimation of luminescence age.

There may well be additional physical based reasons for the failure of luminescence dating. Those that are presented are those with which the author has become most familiar through his own research and is therefore best able to comment upon.

Conclusions

As objectively thinking scientists, we must be able to challenge so-called dates which are put around in scientific literature and media presentation. We can only have grounds to do this if we are familiar with the methods and their limitations, assumptions and flaws. This short paper has sought to communicate something of those which are associated with luminescence dating, a technique which is becoming increasingly used as part of the challenge to Bible truth.

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Following a B.Sc (Hons) degree in Geography (1989–92), the author undertook research applying luminescence techniques to river sediments, leading to a Ph.D. at the University of Wales, Aberystwyth (1992–95). He is currently lecturing in Physical Geography at the University of Northumbria, Newcastle, now researching contemporary and historic fluvial processes, although maintaining links with the geochronology fraternity.

Green Islands

Joachim Scheven

ANYONE strolling through an oak or beech forest in the autumn is sure to find them: among the innumerable brown leaves scattered on the ground lie some which are still green in one corner. Very green, in fact! On closer inspection, we discover there is a whitish spot or a winding brownish tapering trail—a 'blotch mine' or a 'linear mine.' The larva of a tiny mining moth is living inside the leaf. Leaf mining species also occur among beetles and flies.

Why do the infested leaves not turn completely brown like the rest? The larva excretes a hormone that keeps the surrounding area of the leaf fresh. The cells of these 'Green Islands' continue to assimilate food! And the larvæ live on the carbohydrates thus formed even after the leaf has dropped to the ground and has died. Only some time later do the larvæ leave the leaf and enter the ground to pupate.

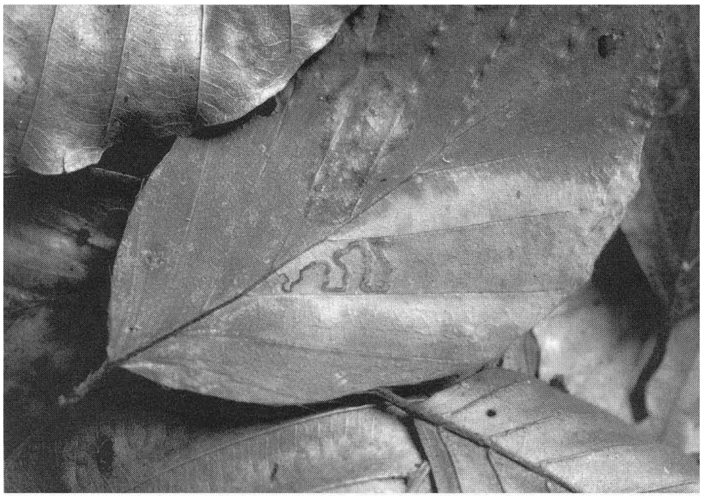
This presents some riddles for adherents of evolution:

—Which were the first caterpillars to stumble on the idea of no longer gnawing the leaves from the outside but of crawling into their insides?

—How could the larvæ, that were thus transformed, know that 'our tree will shortly shed its leaves' so as to prepare for that event?

—What would have happened if the mining caterpillars had failed, at their very first attempt, to synthesise the right hormone, which alone guarantees that they can continue to live on the forest floor?

—What should we make of the fact that such leaf mines are found in the geologically very-oldest fossil leaves of



One of a 'green island' on a forest floor in the autumn. The fossil mine on the beech leaf is of Nepticula turricella *(a tiny moth)*

the Upper Cretaceous of the Dakota Sandstone from Kansas?

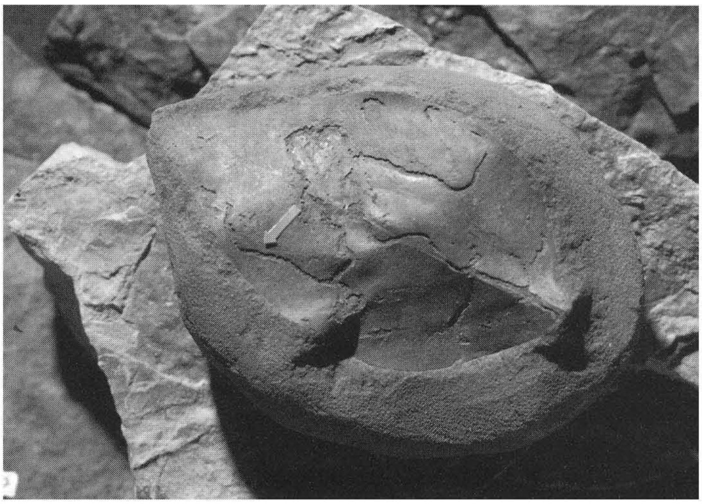
At best, the evolutionist will not be able to produce more than some flimsy 'explanation.' Why not just stick to the truth? What a privilege it is to believe in a Creator who works miracles! These obvious provisions by the Creator for His creatures has been declared by evolutionists to be a mere 'strategy to survive.' As if they didn't know that there is a God. Therefore they are also without excuse.

Among well-known scientists in America a movement has arisen, which could be called the 'design movement.' They aim to draw attention to the perfection and fitness for purpose of living systems through their books, journals and conferences. Just as a watch presupposes the existence of a watchmaker, so the existence of a Creator may be inferred from the existence of the symbiosis—which cannot be explained by chance—between the leaf miner and its leaf. Most people are open-minded enough to concede this. But, on its own, this insight does not lead to eternal life. The question of our sin and its removal remains untouched. Without Jesus, scholars of the most diverse schools of thought can agree about many issues without any problem. The Scriptures say however, that it is the faith of our leaders that we are to imitate (Hebrews 13:7), not their scholarship. As long as a personal profession of faith in the Son of God is lacking, the conviction that there has to be a God is of little use. Whoever would come to God must believe, not only that He exists, but also that He will be his rewarder (Hebrews 11:6). This aspect of God's character can be learned only through the gospel of Jesus.

National scientific museums have long since ceased to honour the Creator God. They deny the Lord Jesus, through Whom all things were made. Their statements about origins are like the lifeless leaf litter on the forest floor, that can be stirred up only with a great deal of noise. By comparison, our museum may be regarded as a 'Green Island,' where the nourishment for eternal life is still being produced. As far as we know, there is no other geological collection in the world where the full range of facts about Earth history and palæontology is explained within the biblical framework.

THE AUTHOR

Dr. Scheven is a long-standing colleague of the *Biblical Creation Society* members and has written for us in the past. He is the pioneer of the so-called 'European model' of Earth history in which the geological record is seen to reflect the Earth's recovery from the Flood. Dr. Scheven is curator of the museum Kuratorium Lebendige Vorwelt in Hagen, Germany, but is looking to the Lord to re-establish the museum in the Rhein-Main area in order to keep it going.



A fossil leaf mine, presumably poplar, in Dakota Sandstone from Kansas

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'The Death of Adam' Revisited:

What the Scholars Say

Philip Duce

THE DEATH of Adam was a profoundly important event in primordial history. Its consequences for the created order and significance in biblical theology have been expounded in an excellent *BCS* article by David Watts, some fifteen years ago (Watts, 1983). A key aspect of the discussion is the nature of the 'death' which came through Adam's fall to the human race. While 'the Bible does not know the distinction, so common among us, between a physical, a spiritual, and an eternal death,' this distinction is helpful in understanding the biblical teaching (Berkhof, 1958, pp.258–261; *cf.* Morris, 1980; Hughes, 1989).

The purpose of this article is not to reiterate the detailed exegetical analysis, but simply to focus on one specific point—the continued insistence by advocates of theistic evolution that *physical* death was not a consequence of Adam's fall, and that the *spiritual death* of humanity was its *only* result. With this in mind, commentaries on Genesis and the New Testament (especially Paul's epistle to the Romans) have been consulted, along with dictionaries and theological works, and the conclusions reached by a variety of conservative evangelical scholars are collated below. In the light of the clear consensus which emerges, some comments are then offered on the claim made by theistic evolutionists.

Prominent among these is biology professor R. J. Berry, who for many years has argued that at Adam's fall, the death that came into the world was spiritual (separation from God), not physical. Physical death was already present, and had been for millions of years, as part of the 'natural' evolutionary biological order (Berry, 1988, 1996). A related claim is that pain in childbirth (God's judgment on Eve, Genesis 3:16) has nothing to do with the Fall, but is just part of normal female physiology (*e.g.* Johnson, 1988).

Such teaching is, in fact, not an innovation by theistic evolutionists, but may be traced back to fifth century Pelagianism, which taught the natural, rather than penal, mortality of Adam. This teaching was anathematized at the North African Council of Carthage in 418 AD (Berkhof, 1958, pp.260,669; *cf.* Wells, 1988). However, an historical survey is not undertaken here, if only because the theistic evolutionists can claim that commentators in earlier centuries did not have the benefit of modern scientific knowledge (*i.e.* that evolution over millions of years has occurred).

The inadequacy of the 'spiritual death only' view is cogently demonstrated in the above-mentioned article by Watts. For Nigel Cameron, the idea is 'somewhat woolly,' and he counters it with references to such authorities as C. K. Barrett, N. P. Williams, C. E. B. Cranfield, Sanday and Hedlam, and even John Hick and C. H. Dodd (Cameron, 1983).

Nevertheless, theistic evolutionists might respond that Cameron and Watts are influenced by their opposition to theistic evolution, and their commitment to special creation (although it must be stated that their position is clearly a result of their exegetical conclusions, and not the reverse). Hence, it is instructive to survey the conclusions of scholars whose work is not primarily concerned with the creation–evolution debate as such.

Conclusions of some contemporary scholars

a. Genesis

In his *Genesis 1–15* (1987) commentary, Gordon Wenham agrees that expulsion from the garden was indeed a drastic kind of death—a 'death before death.' However, physical death was 'the ultimate sign and seal of the spiritual death the couple experienced on the day they ate.' The consequences of their actions are both spiritual (alienation from God—which follows disobedience immediately) and physical (pain, toil, death—which take longer to become evident) (Wenham, 1987).

Henri Blocher concurs: 'The narrative shows us that the threat "You shall die" is fulfilled in a multiplicity of ways, by a whole succession of disastrous changes' (Blocher, 1984, p.172 [*cf.* pp.171–195]). Blocher goes on to say that 'Paul confirms this with all the clarity you could desire. By Adam's offence, death made its entry into the world of mankind (Rom. 5:12; 1 Cor. 15:21; the primary point is *the death of the body*, since its antithesis is *the resurrection of the body*)' (Blocher, 1984, p.184, my emphasis). Paul's antithesis here is between our physical death resulting from the Fall and the (eschatological) resurrection. On Genesis 3:16, Blocher states that 'By announcing that he will "multiply" them, or "make them numerous," God does not mean that there were sufferings in the former dispensation. He is simply saying that henceforth they will be abundant' (Blocher, 1984, p.180–181; *cf.* Wenham, 1987, p.81).

Derek Kidner's 1967 Tyndale commentary (on verse 3:7) quotes Augustine on the point at issue: 'If ... it be asked what death God threatened man with, whether ...bodily or spiritual or that second death, we answer: It was all ...' (Kidner, 1967, p.69).

[Despite these quotations, Lucas has drawn on Blocher ('In the Bible, death is the reverse of life, not the reversal of existence' (Blocher, 1984, p.171–172)) and Kidner (Genesis 2:17 'do[es] not necessarily imply that man was not naturally mortal' (Kidner, 1967, p.64–65)) to conclude that 'the mere cessation of physical existence on earth should not be equated with the "death" threatened in Genesis 2:17. It is sin and its effects that give that event its sting, and incorporate it into "death" in the biblical sense.' (Lucas, 1987). In view of the previous quotations, these appear to be selective readings to support a false choice. Lucas accepts the evolutionary timescale and interpretation of fossil evidence as 'facts,' with the implication that 'animal and plant death preceded the fall.']

b. Romans

Turning to commentaries on Romans, the same conclusion is reached. In the IVP *New Bible Commentary (21st century Edition)* (1994), Douglas Moo states that

> 'Many scholars think that the "death" Paul refers to here [Rom 5:12] is physical death only (Sanday-Hedlam, Godet, Murray); a few, that it denotes "spiritual" death only. But it probably includes both, separation from fellowship with God and physical mortality as the judgment of God on sin.' (Moo, 1994)

[Names for the 'spiritual death only' commentators would have been helpful!]

Thus, Leon Morris, in *The Epistle to the Romans* (1988), states:

> 'The warning to Adam ran, "in the day that you eat of it you shall die" (Gen 2:17, RSV), but in the sense of physical death Adam did not die "in the day" that he ate, nor for many years afterward. It is therefore suggested that a spiritual penalty is meant (*cf.* 6:23; Eph 2:1). To this it is objected that no one would understand from the language used that the writers of Genesis and Romans were referring to anything other than death in its ordinary physical sense (*cf.* Gifford, "That death must here be understood in its primary sense as the death of the body, is clear from the connection with v. 14, where no other meaning is admissible"). Perhaps the best way to understand both passages is to see a reference to both kinds of death. Physical death is in mind, but not physical death in itself; it is physical death as the sign and symbol of spiritual death.' (Morris, 1988).

Similarly, Leslie Allen, 'Romans' in *The International Bible Commentary* (1986):

> 'Death is not merely physical but the sign of the extinction of man's spiritual life' (Allen, 1986).

Although James Dunn asserts, in his *Romans 1–8* (1988), that Adam need not be a historical individual for Paul's theological point to be valid, it is noteworthy that on verse 5:12 he comments:

> ' "Death" ... would have been universally understood as the power which defeats and ends that life which was the chief effect of creation and indeed its whole point.' (Dunn, 1988).

c. Other works

In the up-to-date compendium of Pauline scholarship, IVP's *Dictionary of Paul and His Letters* (1993), J. J. Scott, Jr. concludes:

> 'Paul asserts that humans were created as "living beings" in the fullest sense of the word, but all "died" in the sin of Adam. This "death" is both spiritual and physical, with temporal and non-temporal aspects. Spiritual death began immediately with the entrance of sin into the race and is not bound to time. With it comes separation from God. Death dominates the physical life in the present (Rom 5:14), renders humans helpless (Eph 2:1), and eventuates in the physical and spiritual destruction of the individual.' (Scott, 1993).

In the article on 'Death' in the IVP *New Dictionary of Theology* (1988), Murray Harris states:

> 'By divine decree, physical and spiritual death is the consequence and penalty of sin ... and is the common lot of mankind because all have sinned ... Man and woman were not created unable to die but were created able to not die, although after the fall death became a universal biological necessity.' (Harris, 1988).

The same conclusion is found in such works as Bruce Milne's *Know the Truth* (1982, pp.109, 267), Wayne Grudem's *Systematic Theology* (1994, p.516), Paul Helm's *The Providence of God* (1993, p.98–99) and Don Carson's *The Gagging of God* (1996, p.212–213).

d. Summary

The above survey is, of course, by no means exhaustive, but is of sufficient scope to indicate that the considerable weight of evangelical biblical and theological scholarship is firmly against the 'spiritual death only' view of the theistic evolutionists. Berkhof's statement still stands:

> 'The position of the Church has always been that death in the full sense of the word, including physical death, is not only the consequence but the penalty of sin. The wages of sin is death.' (Berkhof, 1958, p.260).

Conflict

Nevertheless, the claim is made that there is now 'overwhelming scientific evidence' that death had been in the world for millions of years in Adam's day, and that interpretation of Scripture must take this 'insight into God's creation' into account.

In response, some comments made 50 years ago by Geerhardus Vos, in the context of this very issue, remain strikingly pertinent:

> '[A]s is frequently the case, strenuous attempts are made to give such a turn to the Biblical phrases as to render them compatible with what science is believed to require, and not only this, some proceed to the assertion that the Scriptural statements compel acceptance of the findings of science. Attempts of this kind make for poor and forced exegesis. Scripture has a right to be exegeted independently from within; and only after its natural meaning has been thus ascertained, can we properly raise the question of agreement or disagreement between Scripture and science.' (Vos, 1948, p.36–40, quote from p.36–37).

With respect to the specific point under consideration here, there is a clear conflict between the results of Scriptural exegesis 'from within' and the evolutionary scenario. Biblical teaching and evolutionary science make *conflicting truth claims* about the *same* issue.

This conflict cannot be deflected by a 'complementarity' approach (which requires a 'spiritual death only' exegesis in any case (see, for example, Keddie, 1983, pp.4–14)), or compartmentalization into '(mainstream) science versus faith.' Resolution must be achieved either through revised biblical interpretation or revised scientific understanding. Theistic evolutionists opt for the former, but must face up to the consensus against their exegetical claim. [Often it appears that their position is simply asserted with little or no evidence of interaction with the kind of biblical scholarship quoted above, which is all but ignored.]

Furthermore, Berkhof makes some key points:

> 'Suppose that science had proved conclusively that death reigned in the animal and vegetable world before the entrance of sin, then it would not yet necessarily follow that it also prevailed in the world of rational and moral beings. And even if it were established beyond a shadow of a doubt that all physical organisms, the human included, now carry within them the seeds of dissolution, this would not yet prove that man was not an exception before the fall.' (Berkhof, 1958, p.669).

An extremely important, closely related observation has been made by Donald MacKay:

> 'In discussion of the Genesis creation narrative it is often insufficiently realized that the last creative act is recorded not in chapters 1 and 2 but in chapter 3. And (God) said ... "Cursed is the ground because of you ... thorns and thistles it shall bring forth to you ..." ' (verses 17–18, RSV). In short, we are told that the created order as we know now it is a *revised* version. Ours is *not the same drama* as that whose conception is narrated in chapters 1 and 2 and which God pronounced "very good." Some changes may for all we know have been slight; but in one far-reaching respect our natural order is radically different: for ours is a creation "under a curse," "groaning in travail." Not just its human history, but the very principles of natural law reflected in the growth of weeds, the toils of life and the inevitability of decay and death, are different from what they might have been, but for the fall.' (MacKay, 1982, p.189 (original italics), quoted in Helm, 1993, pp.98–99).

Such a conclusion, by such an authority, is noteworthy—yet it still appears to go unacknowledged by senior expositors of theistic evolution. The same point was emphasized by Francis Schaeffer in his exposition of Genesis (Schaeffer, 1972, pp.94–98) and has been reiterated recently by John Peet in this journal (Peet, 1998).

Summary

The force of the biblical teaching on the death of Adam, and its consequences for the created order, calls into question 'mainstream' scientific understanding based on the evolutionary scenario. The search for an alternative, consistent, scientifically-convincing interpretation of historical or empirical physical data is, of course, part of the undertaking of the *BCS* and others. While this may prove to be difficult, Blocher's concluding words from his discussion of Genesis and science express well the attitude which should be adopted (even if Blocher's own detailed conclusions might differ from those of *BCS* members):

> 'If certain factors in today's scientific picture appear contrary to the Word of God, faith is not shaken. It has such confidence in that Word that it can be quite open about its hesitations and wait patiently for the clouds to clear' (Blocher, 1984, p.231).

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News of Creation

Fourth International Conference on Creationism, Pittsburgh, 1998

Ewan More

THE CONFERENCE, which takes place every four years, was held at Beaver Falls in Pittsburgh. The conference organizers did a splendid job of organizing the event even down to the courtesy coach from the airport. A change from previous years was that the conference proceedings were available at the conference. This allowed those attending to pick up a copy of the papers presented during the conference. Audiotapes were also available which include the question and answer sessions too. Some of the lectures were videotaped and videos are available.

One of the changes to the conference was the availability of PowerPoint projection facilities. This allowed speakers to prepare slides on their computer and project them at the conference. This added to the standard of presentation.

The Conference opened with a paper delivered by D. Fouts, *Blotting out and Breaking Up,* on the theme that the Bible does not suggest that the 'blotting out' of Genesis 8 is the total erasure of all evidence of the pre-Flood world. Unfortunately my attention was caught by an early illustration using Greek papyrus. The papyrus in question had been wiped to remove the ink allowing reuse of the papyrus. The evidence of this was the inky stain over which the writer had written. That this was used to explain the Hebrew text of the Old Testament which was probably based on documents written in cuneiform cut into clay tablets puzzled me for the rest of the lecture. This would appear to make the illustration at best superfluous and at worst erroneous.

Subsequent lectures showed a better balance between the biological sciences and the earth sciences. As a biologist, I attended most of the biological and the occasional earth science lectures. One of the first biological lectures I attended was given by Pat Speck, a veterinarian. She gave a paper on the *Paradox of Pregnancy.* I came away with a greater appreciation of the complexity of pregnancy and the implication that it has come about through design (creation) rather than chance (evolution). A second point, which I had not really appreciated, was the need for an immune reaction against the growing embryo to give a successful pregnancy. The need to provoke an immune response from the mother, was an important point in countering the description of pregnancy as the growth of a parasite, which needs to suppress the immune response of the host to prevent rejection.

Another lecture which touched on the concept of design was *Complex Lifecycles in Heterophyid Trematodes* given by Mark Armitage. Mark had studied fish parasites in great detail and was able to show the complexity of the life cycle. I did feel a little uneasy at the idea of parasites being created. We probably need to bear in mind that the creation we are looking at is fallen (*Manifesto* 3.2.1.1 & 3.2.1.2). As a result of the Fall, we should stop short of saying that the way we see nature now is exactly how it was created before the Fall.

There was an excellent paper given by J. Cuozzo on *What happens to the Craniofacial Structure of Humans Who Live Past 100?* The basis of this paper was that mathematical models developed to model aging of the facial bones, when extrapolated, give characteristics very like Neanderthals. If this is the case then Neanderthal features may be an indication of longevity. Neanderthals would be representative of people such as Methuselah who was over 900 years when he died.

Kurt Wise devoted a paper to the question *Is Life Singularly Nested or Not?* This paper sought to examine how far we can go in creating a biblical taxonomy that is hierarchical. The conclusion was that we cannot and that attempts to yield taxa from Scripture quickly cause contradictions because scripture would appear to use groupings for convenience rather than with a fixed taxonomy in mind.

Once back in the UK, I had occasion to re-read the book on the Burgess shales by Stephen J. Gould. In the book Gould sought to show that taxonomy does not show a neat upward trend with man at the top. Rather taxonomy is much more complex and does not readily yield neat evolutionary sequences. Reflecting on this I can see similarities between Kurt Wise's paper and his former mentor's book.

My own paper, *The Created Kind: Noah's Doves, Ravens and Their Descendants*, sought to develop a model of the kind using the two animals we know to have been on the Ark. I leave that for someone else to review however lest I be accused of bias.

Alex Stewart, a fellow Scot, gave a paper on *Global Iodine Deficiencies in the Light of a Global Flood.* It was good to meet up with a fellow Scot but unfortunately Alex is now living in England. I did however meet up with a fellow biology teacher from Scotland. So if there are any more Scottish creationists out there, make yourself known and you will be most welcome to join the Edinburgh creationist group.

One of the last papers was given by J. Goertzen on *The Rhamphorhynchoid Pterosaur Scaphognathus.* The paper sought to show a tangible link between a fossil reptile and ancient texts, which describe a flying dragon. Whilst I was a bit sceptical at the outset, there was a lot of documented evidence that the Greeks and Egyptians both believed in a small flying reptile in the general area of Egypt. I was left wondering whether a small pterosaur had indeed survived the Flood and been living in the vicinity of Egypt.

I hope this gives a taste of the papers given at the Conference and encourages you to read the 1998 Proceedings which can be ordered from Kevin Lewis of Creation Matters (see advertisement on this page).

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Genealogy is not Chronology

Steven J. Robinson

THE QUESTION whether the genealogies of Genesis 5 and 11, as well as being genealogies, provide an absolute chronology has remained a live issue for creationists ever since James Ussher published in 1650 his multi-volume *Annales veteris testamenti, a prima mundi origine deducti* (Annals of the Old Testament, deduced from the origin of the world). Ussher assumed that the genealogies did provide an absolute chronology, and on that basis deduced that the Earth was created in 4004 BC.

However, recent research has established that Solomon's fourth year—the 480th year after the Exodus and thus the anchor for all earlier chronology—began in 968 BC, considerably earlier than the date Ussher calculated. Thus, the latest date for the Creation on the basis of the genealogies is 4174 and the latest date for the Flood 2518 BC.[1] Ussher's date is certainly wrong. Was his assumption about the genealogies also wrong?

Since 1650, our knowledge of ancient history and geology has increased immeasurably. In Ussher's day almost nothing was known about the history of ancient Egypt. The preceding Stone Age and the geological periods before the earliest traces of man were not even concepts. Ussher could therefore assume that the genealogies were complete without any sense that he was defying what was known about the world.

To make the same claim about the age of the Earth today is to be in quite a different position. The earliest event in the Old Testament that can be assigned an absolute date is the birth of Abraham, in 2166 BC. When he was an adult, Egypt and Babylonia were ruled by kings, as were Elam and the numerous cities of the Jordan valley. Many other people groups inhabited the region—for example, Jebusites, Amorites, Girgashites, Hivites, Arkites, Sinites, Arvadites, Zemarites, Hamathites, Horites, Amalekites (Genesis 10:16–18, 14:6–7). Given that the Near East was but a tiny part of the habitable world, it is doubtful whether such a picture is consistent with the earth's having been destroyed and totally depopulated only 450 years earlier. It is, however, consistent with what non-biblical sources reveal about the Near East at that time, as dated on the basis of Egypt's independent chronology (Kitchen, 1995)[2]. If that chronology is approximately correct back to 2100 BC, there must be at least a presumption that it is also approximately correct for the remainder of its dynastic history, back to 2900 BC or earlier. To date the Flood to 2349 or thereabouts is therefore to put it well after the earliest pharaohs and to imply that it was an event which did not affect Egypt. Genesis, however, speaks of a global flood and any such catastrophe must have occurred not only before the first pharaohs, but also before the Predynastic period which preceded them, the Neolithic phase which preceded the Predynastic, the Palæolithic phase which preceded the Neolithic, and the succession of geological ages which preceded the Palæolithic, at least some of which must also be post-Flood! The Ice Age alone, at the transition between geological and archæological history, must have lasted hundreds of years.

Extraordinary claims require extraordinary evidence, particularly if they involve turning one's back on all evidence of time from outside the Bible. Are the arguments that the genealogies represent a strict chronology that compelling?

Unambiguous evidence, such as a total number of years for the generations spanned, there certainly is not. The nearest we get to a genealogy ending with a statement that suggests completeness is in Matthew 1. The genealogy concludes:

> So all the generations from Abraham to David [were] fourteen generations, and from David to the deportation to Babylon fourteen generations, and from the deportation to Babylon to the Christ fourteen generations.

This looks very much like an unambiguous statement. Matthew totals up the generations, and he states that the total encompasses 'all' the generations. Yet the equivalent genealogies in the Old Testament make it clear that the genealogy is far from complete. For instance, three

Abraham	(David)	Jeconiah
Isaac	Solomon	Shealtiel
Jacob	Rehoboam	Zerubbabel
Judah	Abijah	Abiud
Perez	Asa	Aliakim
Hezron	Jehoshaphat	Azor
Ram	Joram	Zadok
Amminadab	Uzziah	Achim
Nahshon	Jotham	Eliud
Salmon	Ahaz	Eleazar
Boaz	Hezekiah	Matthan
Obed	Manasseh	Jacob
Jesse	Amos	Joseph
David	Josiah	Jesus

Table 1. The genealogy of Matthew 1. The second group is counted from David to the Deportation. Since Jeconiah was king 'at the time of the Deportation' (v.11) he belongs to the third group.

generations are omitted after Joram and one generation between Josiah and Jeconiah (Jehoiachin). Unless we are to suppose an average of 88 years per generation, many more are omitted from the early part of the genealogy, where 968 years span the 11 generations between the birth of Jacob and the birth of David (2006–1038 BC). Although Matthew seems to be unveiling a real pattern in history, the pattern is an artefact.

The Genesis genealogies, by contrast, are not even superficially unambiguous. They do not give the number of generations, and they do not total the years spanned by the generations, despite the fact that Genesis 5 punctiliously gives us the sum of each patriarch's age on begetting his son and the years he lived thereafter.

Most of the arguments *for* a no-gaps position, one finds, are simply arguments *against* those which support the contrary position. To the question 'Why take the genealogies to be complete?' the response is 'Because there is no reason not to.' Most of Samuel Külling's discussion (for example) is of this nature. One by one the arguments for believing that gaps may exist are dismissed as either fallacious or inconclusive, and from this it is concluded that gaps do not exist. Such logic is, of course, itself fallacious. To justify the view that gaps cannot exist requires positive reasons, not negative ones.

The two reasons most commonly advanced in justification of the no-gaps position have recently been reiterated by Randall Hardy in a letter (*Origins* 25). These are: (1) the mention of the patriarchs' ages on the birth of their next descendant would be pointless if such genealogies were incomplete; and (2) the contrary view offends the doctrine of the perspicuity of Scripture, or the 'simple approach to the Bible.' Let us, then, consider these arguments.

The function of the genealogical data

First, that the mention of the ages would be rendered pointless—for no author writes without some purpose, be he human or divine. But does it follow that the point has to be the one which Hardy perceives, so that to deny this purpose is to deny that the genealogies are part of the word of God? Hardy seems to be implicitly claiming competence to pass judgment on that word, since if he should be wrong in thinking that the ages are intended to furnish the data for an absolute chronology, he is affirming, on the authority of his own reason, that the mention of them must be pointless. Surely we have no licence to argue in this way (Isaiah 40:13, 45:11, 55:8). While it is legitimate to ask why particular information should be given, it is not legitimate to exalt one's conclusions to the level of Scripture itself. Another may disagree with those conclusions without being unfaithful to Scripture, since Scripture does not state that genealogies which contain ages at birth are complete and those which do not are not. The issue is one of logic and exegesis, not fidelity to Scripture.

Pointless, it is also worth asking, from what perspective? A measure of historical self-consciousness may be appropriate before imputing the purpose which seems most obvious today. An interest in quantifying time is characteristic of the post-medieval European culture into which we are born. It is not characteristic of early Hebrew culture. In computing the date of the Creation at 23 October, 4004 BC, Ussher—the contemporary of Newton and of the founders of the Royal Society—was addressing a question of historical science. He sought to quantify the age of the Earth much as others sought to measure its physical quantities, in the process consulting all the extra-biblical evidence available to a scholar. By contrast, there is no evidence that the Hebrews were interested in the precise age of the Earth, any more than they were interested in giving a precise value for the hours of the day. Is there not a danger that in taking the Genesis genealogies as a strict chronology one is pursuing a peculiarly modern agenda—even a peculiarly creationist one, since in the light of the extra-biblical evidence known today Ussher would almost certainly not have taken them as a strict chronology?

A basic principle of exegesis is that one should seek to understand the text in relation to its own time and place before one applies it to one's own. It is relevant to note, therefore, that no ancient people had an absolute dating system. Our own goes back only to the 6th century AD and was not widely used until the Renaissance. If an Egyptian or Babylonian wanted to date an event, he would date it in relation to the reign of whichever king was on the throne, not a fixed point such as the Flood or the Creation. Although priests would keep lists of kings, some detailing their lengths of reign and going back to the very first dynasties, the priests were not historians in any modern sense. Their lists had no chronological function; most omitted certain kings, and none indicated when two or more dynasties reigned at the same time. Likewise, genealogies could omit generations without indication.

The first persons to make the mistake of assuming that ancient genealogies or king-lists could be used as a strict chronology were in fact the Egyptian priests themselves. Herodotus reports about them (5th century BC):

> They declare that 341 generations separate the first king of Egypt from the last I have mentioned and that there was a king and a high priest corresponding to each generation. Now to reckon three generations as a hundred years, 300 generations make 10,000 years, and the remaining 41 generations make 1340 years more; thus one gets a total of 11,340 years, during which time, they say, no god ever assumed mortal form. [Book II, 141.]

Although such comparisons do not prove that the genealogies in Genesis omit generations, they do help us to understand the world in which Genesis was written. Events in that book are dated, if at all, by reference to the age of the patriarch involved. The Flood, for example, is dated to the 600th year of Noah, not *Anno Mundi* 1656. Evidence for the use of a fixed reference point does not occur until I Kings 6:1—the only such instance—which says that Solomon began to build the Temple in the 480th year after the Exodus (*cf.* Judges 11:26). Thereafter events are dated, if at all, by reference to the reigns of Solomon's successors.

The 'point' in recording someone's age in a genealogy was, one presumes, to describe the length of time that had passed since that person was alive. It does not follow that Moses had the same purpose when including the genealogies in his book. The Genesis 11 genealogy is designed primarily to provide a literary–historical bridge between the Flood and Abraham. It links Abraham, the 'father' of Israel, to the preceding history of all mankind. That purpose is, of course, distinct from the purpose of those who first maintained the genealogy. A sequence of ten or a dozen names, none of which had any significance outside the genealogy, would have been sufficient, even if the complete list had run to 200 generations. Indeed, in relation to the literary-historical purpose, it would have been pointless to include all 200, supposing that a complete list might have been maintained that long.

In all probability, of course, the genealogy would have been abridged many times over. As David Henige puts it,

> It has long been recognised that, in most societies where kinship is the primary means of social and political control, genealogies are likely to be foreshortened. Such genealogies tend to remain approximately the same length over time, but their components change constantly; relevance and utility are the guiding principles. The classic African example of the process of this 'structural amnesia' is that of the Tiv [tribe] as described by the Bohannans. After the Tiv genealogies were recorded in the early colonial period, the British naturally expected the details to remain constant, with additions as time passed. The Tiv, however, claimed, as time passed, that the earlier genealogies were incorrect; indeed, from their own perspective they were.

In the same way, Abraham's forbears would have revised and abbreviated the genealogy repeatedly, and it would have undergone still further revision in the 20–30 generations between Abraham and Moses. Its primary purpose was simply to make connections, in the same way as 'Jesus, son of David' makes a connection.

The meaning of the words themselves

The second argument is that the genealogies should be taken as complete because that is how they appear. For support Hardy cites John 14:2, where Jesus assures His disciples that there are many rooms in His Father's house, asking 'Were it not so, would I have told you that I go to prepare a place for you?' From this he draws the conviction that 'if things had happened differently, He would have told us so'—that is, differently from the way, according to his avowedly simple approach, Hardy himself understands things to have happened. But this is not what Jesus is saying. He is encouraging his disciples to believe in Him (14:1), because His words are trustworthy. Specifically, they should believe that there is room for them in His Father's house.

The perspicuity of Scripture, so understood, is not a biblical doctrine, and it is unsafe to justify one's preferred interpretation on the grounds that it is the most straightforward or takes the text 'at face value.' New Testament writers do not always interpret the Old Testament straightforwardly (*e.g.* Matthew 2:18). Jesus often spoke in an indirect way (Matthew 13:13–15) and was often misunderstood, even by his disciples (John 21:23). Some things in Paul's letters are difficult to understand (2 Peter 3:16). Because of the frequent use of metaphor, the genres of prophecy and apocalyptic yield little to a hermeneutic that takes everything at face value. A vision given to Isaiah was expressly said to be uninterpretable (Isaiah 29:12). Even where the linguistic meaning of a passage is clear, it is not always clear what its point is (*i.e.* what we are supposed to learn from it).

Since Hardy recognises that other genealogies in the Old and New Testament contain gaps, even though they appear to be complete, he is implicitly conceding that Scripture cannot always be taken at what an unsophisticated reader today would suppose to be face value. He argues that we know of the gaps 'because the Bible provides the full list elsewhere' and therefore makes an exception of those genealogies. But if the demonstrably incomplete genealogies appear to be complete, how can one know that any really are? The only thing that one can say with confidence is that the others are less incomplete.

As an illustration, consider the genealogy in Exodus 6:16–20, which says that Kohath was the son of Levi, Amram the son of Kohath, and Moses the son of Amram. It also gives the age of these fathers when they died. Taken at face value, the genealogy appears complete. However, in I Chronicles 7:23–27 we find that Ephraim, one generation after Levi, and Joshua, one generation after Moses, are not three but ten generations apart. Is, then, the latter genealogy complete? Not necessarily, for we know from other scriptures (Genesis 15:13, Exodus 12:40) that the period from Levi to Moses spanned 500 years, and 50 years per generation, although not impossible, is too high to be a likely average.

As noted by William Green (1890), Exodus 6:20 is additionally instructive for providing a close parallel to Genesis 10:25 and 11:16. To the modern reader it seems almost to demand that no gaps be contemplated:

> Amram took to wife Jochebed his father's sister and she bore him Aaron and Moses, the years of the life of Amram being one hundred and thirty-seven years.

Amram seems to be the immediate father of Aaron and Moses in the same way as Eber seems be the immediate father of Peleg and Joktan. Yet in Numbers 3:27–28 we read that in Moses's lifetime 'the family of the Amramites, and the family of the Izharites, and the family of the Hebronites, and the family of the Uzzielites' numbered 8,600 males.[3] Since Izhar, Hebron and Uzziel were apparently the brothers of Amram (Exodus 6:18), it would appear that on average each brother fathered 2,150 sons. *Pace* Richard Johnston (1998), who estimates that only 68 years separated the births of Amram and Moses, this is not credible. Rather, the phrase 'Jochebed bore him Aaron and Moses' must be understood as condensed for 'Jochebed ... bore him a child who was to be the ancestor of Aaron and Moses.' Reasoning in the same manner as any 'secular' philologist would, the biblical scholar must conclude that the true meaning of the phrase 'X bore Y' or 'X begot Y' (the Hebrew verb, *yalad*, is the same) is wider and less precise—less quantified—than the apparent literal meaning: merely, 'X became the ancestor of Y.'

Consequently when we read in Genesis 11:16 that

> Eber lived thirty-four years, and begot Peleg; and Eber lived after he begot Peleg four hundred and thirty years, and begot [other] sons and daughters

we should be careful not to read more into this than Hebrew usage warrants. All that we can legitimately conclude is that, when Eber was 34, he became the ancestor of Peleg, thereafter living a further 209 years. The fact that the text specifies Eber's age when he begot Peleg does not negate the point. The age may have been given because it was in the genealogy or genealogical tradition from which the author drew. Through its particularity it testifies to the authenticity of his source, just as the preservation of obsolete place-names (*e.g.* Genesis 14:2) testifies to the authenticity of other sources.

Determining the true limits of the word 'beget' is the key question as regards the genealogies. Those who hold that they are continuous need to demonstrate that 'beget' must betoken immediate paternity. That cannot be done. *Yalad* in the Hebrew (*cf.* Ruth 4:18–22), like *γενναω* in Greek (Matthew 1:3–6), merely betokens descent: the fact that the descendant, no matter how far down the line, was in the loins of his ancestor (Hebrews 7:10).

Sudden falls in lifespan?

But extraordinary fertility and promiscuity is not the only improbable result of the no-gaps position. According to Johnston, one must suppose that Shem, Arphaxad, Shelah, and Eber were all still alive when Abraham was born, and, except for Arphaxad, were still alive when Abraham left Haran. Eber would even have survived Abraham by 4 years. How is it, then, that Eber lived for 464 years, whereas Abraham, dying 'an old man and full of years,' lived to only 175?

Johnston answers the question by attributing the sudden falls in life expectancy to catastrophic events that affected the environment after the Flood. The Flood itself, apparently, had no effect on life expectancy, since Noah, who was 600 when the *mabbul* broke out, lived a further 350 years and attained an age greater than most of his forebears. On the other hand, it did have a damaging effect on people's reproductive cells, since Arphaxad, who was born just two years after the *mabbul* (*i.e.* one year after Noah left the ark), lived to only 438, and his immediate descendants also attained ages less than half that of Noah. Thus we are to suppose that the reproductive cells of the few who survived the flood were damaged severely but all their other cells were not affected at all. By way of further complication, Johnston postulates that their life expectancy began to be affected only 350 years after the *mabbul,* so as to account for Shem's living to only 600: his life expectancy was the same as his father's for most of his life, but in the final 150 years, as a result of a great increase in catastrophism, it fell by 37%.

But what events after the Flood could have had as catastrophic an effect on reproductive cells, and hence life expectancy, as the Flood itself? If the changes resulting from the *mabbul* brought about a 50% reduction in life expectancy (from 950 to 468 years), ought one not to be looking for a catastrophe of equal magnitude to explain the almost 50% reduction which occurred between Eber and Peleg and the over 60% reduction which occurred between Eber and Abraham? Johnston suggests that if Genesis 10:25 refers to the division of the earth into continents (an interpretation that is not established and probably wrong), an associated 'environmental event' might account for the drastic reduction in Peleg's life expectancy. However, there are problems. Continental division was a process, not an event, so why should it have resulted in a sudden fall? Johnston hypothesises that the decisive event took place immediately prior to Peleg's birth, permanently damaging reproductive cells. But why was his successor, Reu, not affected by the changes that accompanied the division? What kind of 'environmental event' could have been so much greater at the beginning of the process than in the course of it? How could Peleg's reproductive cells have been damaged in a heritable way, and without killing either him or his parent? What sort of catastrophe could have been so deleterious, yet still leave the patriarchs enjoying lifespans many times our own? And what evidence is there for the required catastrophe in the physical record? Since the notion that geological events caused the sudden falls in longevity is a secondary hypothesis, dependent on the hypothesis that the genealogy in Genesis 11 is complete, these questions should be addressed, for they are the sort which test and cast doubt on the main hypothesis.

Without a prior commitment to a no-gaps position, it is precisely the sudden falls which suggest large gaps in the genealogies. The patriarchal ages run as follows:

Noah	950
Shem	602
Arphaxad	438
Shelah	433
Eber	464
Peleg	239
Reu	239
Serug	230
Nahor	148
Terah	205

The sudden falls after Shem and Eber are followed by an approximate plateau. In the group Arphaxad-to-Eber there is no falling trend; in the group Peleg-to-Serug it is possible to infer a slight fall. Johnston interprets this pattern as evidence that major catastrophes did not occur between Arphaxad and Eber and between Peleg and Serug. However, a less problematic solution would be to suppose that the genealogy is complete within those groups but incomplete between Shem and Arphaxad and between Eber and Peleg.

Figure 1 shows how, if one postulates an interval between the Flood and Abraham more in keeping with the geological and archæological record, it becomes possible to understand the patriarchal ages as following a gradual decline. Note that, according to this sort of timescale, Peleg would have been born shortly after the time when the Babel event occurred, at the beginning of Mesopotamia's dynastic history and the building of its first cities (Robinson, 1998). This would accord with the view that Genesis 10:25 refers to the division of the earth into territories (Deuteronomy 32:8) as a result of the confusion of language rather than the geological division of the earth into continents, as I myself used to believe.

One cannot, of course, assume that all ages in the genealogy are representative of maximum life expectancy. This may be reasonable where a series of ages shows approximately the same length. However, Lamech's age of 777 (Genesis 5:31) is well below the average for his time, as is Nahor's (Genesis 11:25). It is possible that, for whatever reason, Shem also did not live to his maximum. Consequently, the inference that changes in environment wrought by the *mabbul* caused an initial fall in life expectancy must be highly uncertain. As Johnston points out, but without drawing the appropriate conclusion, Noah continued to live for another 350 years, attaining a longevity similar to that of his forefathers. Since Shem too was an adult at the time of the *mabbul*, there is no reason to think that his life expectancy would have been affected by it either.

What caused the fall in life expectancy is impossible to say. Although 'genetic drift' may have been a factor, it would not explain why there was no fall in life expectancy in the centuries before the Flood, when people were also multiplying and spreading across the earth. Another possibility might be some 'epigenetic' mechanism (see Vines, 1998). Potentially, the decline is reversible (Isaiah 65:20).

How long after the Flood was the first city?

According to a strictly literal reading of Genesis 10, Nimrod was the son of Cush, the son of Ham, the son of Noah, and hence belonged to the second generation after the Flood. Nimrod built Babel, Uruk and Akkad in the land of Shinar, and went on to build other cities in Assyria.[4] On the other hand, Peleg, in whose days the earth was divided, was of the fourth generation. Thus, if the genealogies of Genesis 10 are complete, one must suppose that either Cush and Nimrod were born much later in the lives of their parents than were the ancestors of Peleg, or the division of the earth occurred after Nimrod built Babel.

The Table of Nations, it should be remembered, was written from the perspective of a person living at the time of Abraham and in the land of Canaan. It is not a list of all the peoples living at that time, and its function is not to show in detail how all the earth after the Flood was colonised. It considers the peoples which Israel knew about, showing how they descended from Noah's sons and their sons. For that purpose it does not need to list every generation, only the principal family groups—families in the sense that they could trace their ancestry and

	DOB	Age
Adam	17000	930
Seth	16870	912
Kenan	16675	910
Jared	16540	962
Methuselah	15969	969
Noah	15600	950
Shem	15099	602
Eber	*7000*	*464*
Peleg	*2900*	*239*
Terah	2296	205
Abraham	2166	175
Jacob	2006	147
Amram	*1800*	*137*
Moses	1526	120
Eli	1183	98
Augustus	63	70
Gregory	−540	64
Henry I	−1068	67
Henry III	−1207	65
Present day	−1900	75

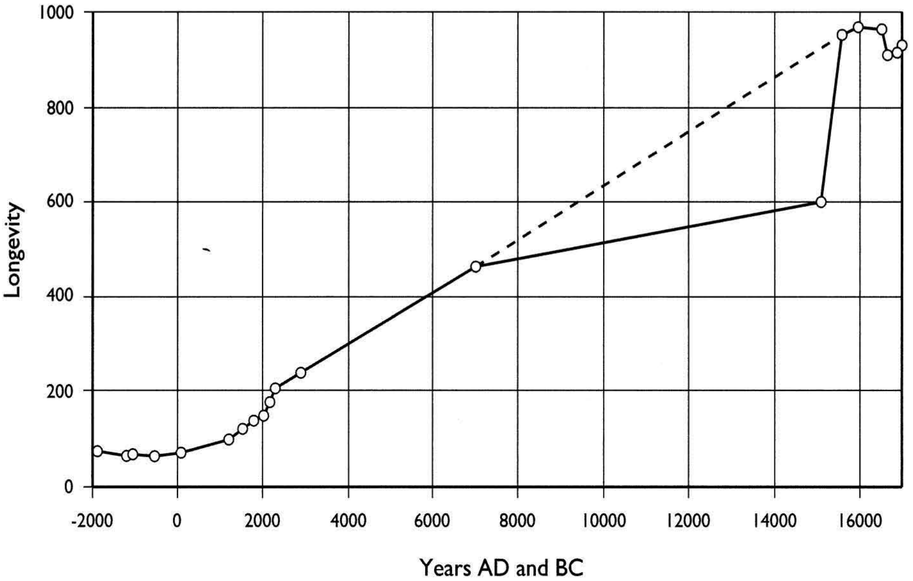

Figure 1. Ages of some of the longest-lived men from the Old Testament record together with certain monarchs from the last 2,000 years of history, plotted against time. The dates of Eber, Peleg and Amram are interpolated, and all dates before Terah are hypothetical. The dotted line shows the trend if Shem is omitted, on the basis that he did not achieve his maximum lifespan.

sense of kinship back to one man (*cf.* Numbers 3:27). Many of the names are collective (*e.g.* Kittim, Pathrusim, Jebusites, Amorites), so that it is clear that we are not here dealing with a complete genealogy. Shem is described as the father of all the sons of Eber, 'father' meaning ancestor and 'sons' descendants. As the genealogy shows a few verses later, Eber was not the grandson of Shem. Similarly, Peleg and Joktan, the 'two sons' of Eber, were not necessarily of the first generation after Eber, and Nimrod, who is not listed among the sons of Cush in 10:7, may not have been his immediate son.

The table ends by saying that the nations, all descending from Noah's sons, spread abroad on the earth after the *mabbul*. There is no suggestion that they did so only from the time of Peleg, nor that the movement was driven by the confusion of language at Babel. The next verse (11:1) sets the scene for the Babel story by noting that 'the whole earth was of one tongue and the same words.' As in 10:25, 'earth' appears to have a universal sense: humanity living on all the earth, rather than all humanity living on a small part of the earth (Wenham, 1987). Against this backdrop we find a group of men migrating from the east and settling in the land of Shinar, where Nimrod began establishing a kingdom.

It is surely obvious that 2–4 generations after the *mabbul* is much too short a time for men to be building Mesopotamia's first cities. By this stage (late Neolithic), they had spread into every habitable continent, even as far as Australia and South America. Since men are likely to have moved into new lands only as their numbers grew and food resources came under pressure, the process could have taken thousands of years.[5] Here, as on so many questions, it is not necessary to suppose that the Bible says one thing and the real world (the data of the physical world, whether interpreted by the regenerate or the unregenerate) something totally different. The people who were scattered at Babel, according to Genesis, were its builders, not all mankind; the language of all the earth became confused as men from Babel spread across the earth, through cultural and military conquest (Robinson, 1998). This is probably why 'Tower of Babel' legends are much less common than legends of a global Flood: the event was not something experienced by all humanity.

The genealogy of Genesis 11:10–29, which comes after the story of Babel, amplifies and extends the manifestly incomplete genealogy of 10:21–31 because of its significance for the sons of Israel (just as the story of Babel probably picks up the obscure reference in 10:25). The subsequent narrative tells how, in the midst of this process of nations spreading abroad on the earth, God took one man and created his own nation, setting apart for it land which others had already occupied.

Are there biblical constraints?

To entertain the possibility that the genealogies skip over many generations is, according to Hardy, to go down a slippery slope, tantamount to 'tampering with the historical reliability of the entire creation account.' The evidence of geology and archæology (in ignorance of which the genealogies could be taken as a strict chronology without discomfort) should be set aside, lest one 'align [oneself] with secular thought' and accept assumptions and methodologies which lead to the doctrine that the Earth's age is billions of years. Unless an uncompromising line is drawn as far away from that position as it is possible to be, weaker-minded creationists, it is implied, will gradually drift away from a young-earth position, until they too believe that the Earth is billions of years old—and then one is but a short step from renouncing doctrines which *are* fundamental. Creationism's failure to explain the world on this basis is a small price to pay, compared with the comfort of knowing that one is trusting the word of God!

To argue thus is of course to abandon all pretence that belief in Genesis is compatible with what is known about the world. Far from trusting the word of God, it is to retreat into a ghetto. Forever having to turn a blind eye to difficult evidence, the creationist can say nothing of apologetic value.

However, it must be repeated that there is no biblical evidence that the genealogies are complete. Consequently, to maintain otherwise is to slide down another slippery slope, towards sectarianism. It is to 'bind heavy burdens, hard to bear, and lay them on men's shoulders,' teaching as doctrines the precepts of men. In appearance one is saying, 'Let God be true, and every man a liar,' but in fact one means, 'Let us be true and God apparently a liar,' since reality is plainly at odds with a strict chronology. God is invoked to justify a misreading.

True faith does not withdraw from the world. Insofar as our business is to demonstrate that the evidence of geology and archæology is compatible with belief in Genesis 1–11 as reliable history, we should look the evidence full in the face and seek to understand its message. If the Bible is true, it will, by definition, accord with reality. The written Word and the world which the Word brought into existence need to be understood in the light of each other, because the world testifies of him who created it. Both require interpretation in order to be understood. If there appears to be conflict, it may be that the Word, rather than the world, has not been interpreted correctly.

Once one recognises that there *might* be gaps, the question of whether there are gaps, and how many, becomes a geological and archæological question as much as a biblical one. It becomes a question of examining the testimony of the thing which is being dated, the Earth itself, and man's remains on the Earth. And then one recognises that the geological record alone requires thousands of years: time enough for the horse family (Garner, 1998) and a multitude of other organisms to evolve and diversify, for stromatolites, encrusted hardgrounds and reefs to grow where they are found, for bacteria to produce vast oil and gas deposits and so on. The palæontological data within the rocks are not irrelevant.

But there are biblical limits. On the one hand, we should bear in mind that 'with the Lord one day is as a thousand years, and a thousand years as one day,' that God often takes longer to fulfil his purposes than his servants would have expected; on the other hand, we should not suppose that 'all things have continued thus from the beginning of creation,' for the world is always changing and was once very different (2 Peter 3:8f). History is long enough for the final two thousands years to be described as the 'end of the age' (Hebrews 9:26) and the 'last times' (1 Peter 1:20), even the 'last days' (Hebrews 1:2); but it is also short enough for Abraham's predecessors to have preserved a tradition that went all the way back to the first man, 'Adam, the son of God.' Beyond a certain point, the longer one makes the pre-Abraham period, the more unlikely such a tradition becomes. Again, God said to Noah, 'Be fruitful and multiply, bring forth abundantly on the earth and multiply in it.' On the assumption that man did bring forth abundantly, the period between Noah and Abraham cannot be as long as modern dating methods imply. Even 20,000 years might appear excessive.

Nonetheless, the shape of history may not have the proportions which we have been accustomed to envisage, in which a relatively brief interval separates the Flood from the rise of the first cities. Civilisation in relation to the total span may not be the dominant theme. Half of history, perhaps more than that, may have been geological prehistory, during most of which the Earth's human population was too small and localised to leave a trace. What can be affirmed is that man has existed for as long as a habitable Earth has existed. That, as regards the age of the Earth, is the fundamental doctrine of Scripture, and that—not an impossibly strict chronology—is the message, I suggest, of the Genesis genealogies.

Notes

1. These dates are according to the Masoretic Text, which is the most reliable text and gives the shortest chronology. See Hasel (1980), Ray (1985) and Williams (1998).
2. Unfortunately, Kitchen dates the Exodus to the 13th rather than the 15th century, on the grounds that the latter is inconsistent with the archæological record as currently dated. As regards that inconsistency, see D. M. Rohl, 1995, *A Test of Time: The Bible From Myth to History*, Century, London. Rohl dates the Exodus to the 15th century but follows the Septuagint at Ex 12:40, which, if the genealogies were complete, would lead to a date of 2333 BC for the Flood.
3. The true reading is probably 860 males, so that each brother on average would have fathered 215 sons—still not a credible figure. See Humphreys, C. J., 1998, *The number of people in the Exodus from Egypt: decoding mathematically the very large numbers in Numbers i and xxvi*. Vetus Testamentum, 48:196–213 and bibliography therein.
4. The sense of 10:11a is uncertain, since Assyria may be a person (read: 'From that country Ashur went out and built ...'). See Wenham 1987, pp.223f.
5. This discussion constitutes a repudiation of ideas I presented on the subject in CEN Technical Journal, 9:45–68. There I supposed that Nimrod began building Babel in the Jurassic, hundreds of years before he built Nineveh and the other cities. This is not a tenable view—either geologically or archæologically. Mesopotamia was under water for most of the Mesozoic and was never a suitable place for colonisation during that era, while the earliest evidence of man in the vicinity (in the Jordan valley) is end Cenozoic.

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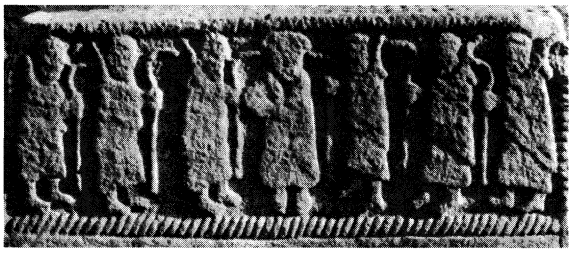

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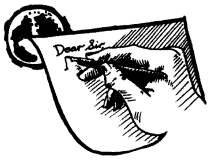

J. H. Harrison (Craigavon)

I appreciate the magazine very much and the other literature. I may add that I have very little academic background in the science and other fields of study covered by your society, but apart from some very technical studies, I am able to appreciate and grasp the significance and message of most of the articles. Every blessing in your important ministry.

R. A. Stewart (Darlington)

May I take this opportunity to say what a great publication *Origins* is. Although I am not an academic person, I do find the articles fairly easy to read, helpful and informative. Keep up the good work.

Michael J. Oard (Montana, U.S.A.)

Last summer (1998), I had mentioned to several other creationists that we need a good study on supposed horse evolution. Despite a number of evolutionists who have stated that the horse series is quite complicated with much variability at any one time, the horse series is still widely used to date Cenozoic deposits. A number of years ago, I viewed a video on horse evolution at the Smithsonian Institute. The video was well done and a powerful tool to persuade people of evolution. So, I was happy to see an article on the topic of horse evolution in the October 1998 (No. 25) issue of *Origins* by Paul Garner.

Paul brought forth a number of good points, such as the horse lineage being a gross oversimplification that is actually misleading (p.14). He pointed out that just because horse fossils are found at the surface does not pose a problem, as suggested by one creationist (p.19). He rightly questions the fossil divisions advocated by Frank Cousins, and points out that it is possible that ancestor and descendent fossils can be found in the same layer with no contradiction to the evolutionary scheme (this of course depends upon the degree of difference between the ancestor and descendent). His point about regulator genes being switched on or off as an explanation for the lack of small intermediate changes, such as the difference in the number of toes, in the fossil horses is reasonable within creationist baraminology. His information on the variable number of ribs (p.20) in a species is most interesting. This is significant information for baraminology. If the number of ribs can be this variable within a baramin, how variable can other morphological features be, such as the number and shape of teeth? I go along with Mr. Garner's belief that the biblical horse kind or baramin is at the family level (p.22).

However (and this is what some of you are waiting for), I question Mr. Garner' s acceptance of the relative change in the horse baramin within a post-Flood model. The horse series needs first to be rigorously documented as a real stratomorphic series (using Kurt Wise's terminology), and second that the series is post-Flood.

I believe that the quote by Byron Nelson (p.19) is actually close to the truth. Fossil horses are found in widely scattered areas of North America, and different types are not often superimposed vertically in a particular outcrop. Furthermore, it is rare to be able to physically trace one horse-bearing layer to another, not only because of the wide separation of the fossils, but also because the basin deposits, where horse fossils are mostly located, change facies frequently. So, the dating of the rock is done predominantly by fossil correlation, especially by the horse series. This involves the initial acceptance of such a horse series and, hence, adds a strong element of circular reasoning to the whole business. The same procedure also is applied to other Cenozoic fossil vertebrate sequences.

At many fossil vertebrate sites, representatives of these other sequences often are found with the horse sequence. All these vertebrate sequences can be integrated into the evolutionary scheme by accepting additional hypotheses, such as : (1) ancestors and descendants able to be found in the same layer, (2) 'advanced' or ''primitive' forms allowed in one layer, (3) reworking, *etc.* I bet there is much hand wringing behind the scenes to force fit all these fossils into an evolutionary scheme and make the big picture 'good looking' and 'agreeable' with apparently no contradictions.

For those who do not believe the fossil, radiometric, and other dating schemes are plastic enough to accomplish this evolutionary picture, just read and meditate on the appendix, called the 'Dating Game,' in Marvin Lubenow's excellent book, *Bones of Contention* (1992, Baker Book House). Besides showing widely divergent radiometric dates, the evolutionists were able to manipulate five 'independent' fossil and radiometric dating methods to first arrive at a 'consistent' date of about 2.6 million years for Richard Leakey's fossil KNM-ER 1470 found in northern Kenya. But, the evolutionist thought the skull too modern, so after several years of 'redating,' all the methods were changed and became 'consistent' with a date of about 1.8 million years. This does not seem like a large change, but it represents a decrease in supposed age of 30% by methods that are claimed to be precise and independent.

Mr. Garner is so right when he states that how creationist interpret the horse sequence will depend upon which Flood model they believe (p.21). The ridiculous and uneducated quote by anticreationist Kenneth Miller (p.21) does not make any point at all, if one does not accept that the horse sequence is a stratomorphic sequence. After a brief flirt with the Cenozoic post-Flood catastrophic model, I have come to accept most aspects of the Whitcomb–Morris model based on copious evidence, some of which has been published (Oard, 1996, 1998). From my perspective within the Whitcomb–Morris Flood model, in which the Flood/post-Flood boundary is in the late Cenozoic, the various horses lived together before the Flood. Then the Flood spread their carcasses over large areas of the continents and deposited them where they are found today, mostly in various widely spaced basins. For example, some types with, say, 3 toes and short-crowned teeth ended up in basin 1, while the one-toed variety with long-crowned teeth ended up in basin 2, while a mixture ended up in basin 3, *etc*. This does not represent a time sequence but chance burial. I am simplifying because we likely do not know the complete fossil distribution in each of these basins. The fossil variability likely will grow with further fossil collecting.

As an example of some of the complications in the horse sequence, I will add information from research Peter Klevberg and I have performed on the Cypress Hills and Flaxville gravels. These distinctive gravels are not in a basin but are capping plateaus on the high plains of Montana, Alberta, and Saskatchewan. The Cypress Hills Formation in Canada is a dissected plateau with a former area of about 3,000 square kilometres. The western end of the plateau stands 1500m ASL and is more than 600 metres above the rivers to the north and south. The western and central Cypress Hills plateau is capped by about 30m of coarse exotic gravel derived from the southwest at least 300km from the Rocky Mountains, or 500km from central Idaho as some now believe (Leckie and Cheel, 1989). The coarse gravel, up to 43cm in length and weighing 26kg, is very well rounded, mostly quartzite, and iron stained with abundant percussion marks. The transport distance to the eastern Flaxville gravel is at least 700km from the Rocky Mountains or 900km from central Idaho. The eastern Cypress Hills has many sand interbeds where abundant vertebrate fossils are found. Identical gravel is found over most of the region at lower altitudes, but has often been reworked by glaciers. We have presented quantitative evidence, based on open-channel flow equations, that these mostly quartzite rocks have been transported over distances of 700km on a low slope by broad currents travelling at least 30m/sec from off the Rocky Mountains, the continental divide of North America (Klevberg and Oard, 1998; Oard and Klevberg, 1998)

All this huge amount of coarse gravel is variously dated from early Pleistocene to middle Eocene based on fossil vertebrates. The horse series figures prominently in deriving the dates of the gravel. It was mainly fossil horses and titanotheres that dated the Cypress Hills gravel as early Oligocene—a date that had stood for 100 years. However, a new researcher has discovered in supposed correct stratigraphic position 'mid to early Miocene' and 'mid Eocene' fossil horses in the Cypress Hills Formation. These new dates are now more 'consistent' with previously anomalous dates from other gravels. So, the Cypress Hills Formation is presently dated from 45 to 15 million years within the evolutionary timescale, and yet all the gravel on the Cypress Hills and elsewhere is virtually identical and little weathered, even from the 'early Pleistocene.' From the following quote from this researcher, can anyone blame me for being sceptical of any horse stratomorphic sequence in these gravels?

> 'How could we fail to see such a major difference [in the horse fossils] in more than a hundred years of research on the Cypress Hills Formation? The answer is probably a combination of incremental discovery, willingness to accept assumptions, and bad luck ... The nature of *Archæohippus stenolophus* represents the factor of bad luck: *Archaeohippus* retains many primitive features, and superficially looks a lot like *Miohippus*, especially if the investigator has no additional clues in the form of associated fauna' (Storer and Bryant, 1993, p.667).

Based on the similarity of the gravel and the type of mechanism that likely deposited the gravel, Peter and I have concluded that the Cypress Hills Formation, the Flaxville gravel, and the other gravels were laid down during the recessional stage of the Flood (Oard and Klevberg, 1998). All these horses in the Cypress Hills Formation, which represent a broad evolutionary stratigraphic range, were laid down about the same time during the late Flood.

And this brings me to the second problem with Mr. Garner's thesis, and that is the fossil horse sequence represents a post-Flood collection of horses. This immediately brings up the problem of how the supposed stratomorphic series developed after the Flood? What post-Flood mechanism would divide various horses into a morphological time sequence? Furthermore, how can the Cenozoic with its huge volume of strata; its massive, very pure coal seams; massive worldwide uplift of most mountains; huge volcanism; huge erosion of the continents; massive deposition on the continental shelves, *etc*. be explained after the Flood (Holt, 1996; Oard, 1996)? In the area where I live, if the Cenozoic is post-Flood, there would have to be massive deposition of sediments (for instance 5km deep Cenozoic valley fill sediments in the Big Hole Valley, southwest Montana, at a current elevation of over 2000m ASL), followed by widespread currents flowing off the continental divide at greater than 30m/sec and eroding at least 1000m of sediment from the high plains forming widespread erosion surfaces. These features do not speak of post-Flood activity, but fit in very well with the Flood, especially the recessional stage. Many more such evidences can be stated.

For further research on the fossil horse sequences by Mr. Garner or other creationists, I would recommend the examination of fossil vertebrate sites, study of the fossils themselves after a thorough literature search, analysis of the geological context of the fossil sites, and going out and finding our own fossil horses. We likely would discover a different pattern from the standard evolutionary horse sequence, similar to the different pattern emerging when creationists actively do our own radiometric dating.

I thank Peter Klevberg for looking over a first draft of this letter and for offering comments.

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[*Editorial comment:* we are pleased to carry this response from Mr. Oard. Paul has decided that a response is not necessary. Clearly the judgment as to how we interpret the fossil data depends on the geological model (relative to the Flood) that one chooses. Paul's article conforms to the position accepted by the *BCS* committee and editorial team and is reflected in our articles.]

Tim Constable (Coventry)

While I can follow the basic drift of the arguments in Phil Duce's article (Genesis: the New Testament and Historicity, *Origins*, 1998, (24):10) sympathetically, there are a number of points which I would like to contend.

1. The reference to Morna Hooker is surely a circular argument with Adam and Christ only an 'ill-balanced pair' within a *presupposed context* of Adam's mythical nature! Likewise, demythologising is only a problem within this presupposed context if there is no literal historical Adam to be revealed.
2. In the section headed 'Conditioning,' Phil Duce states that 'Jesus and Paul preached 'timely' truth rather than 'timeless' truth in some ... abstract sense.' I cannot agree with this! The fact that all their teaching is still as relevant today shows they were teaching *timeless* truth but in a number of timely ways—just as it needs to be preached today! The basics of God's truth is simple enough for almost anyone to understand (albeit with scope for the deepest analysis). It also contains its own built-in 'culture-proofing' by expressing the same truths in different ways, at different times, to different cultures. However, like a hologram, taking one small part and analysing it, no matter how closely, will still not reveal the information available from the rest of the hologram. In the case of God's message, a 'low resolution' version of the entire image can be preferable to an over-analysed small section.
3. To worry about a 'contextual shift ... appearing to relativize Scripture ... because we are weak, limited, ignorant and sinful' is only a problem if the Holy Spirit is not actively involved in the interpretation (as he was in the original writing!). If He is not, the results will be worthless anyway. Much of this argument ignores the supernatural dimension of God's word, which to my understanding of the doctrine of inerrancy applies.
4. Books such as Kings and Acts document facts which can be historically verified. But Ezekiel and Revelation document facts too! The only difference is that they are expressing facts beyond our direct understanding. On a scale of 1 (natural/understandable/verifiable) to 10 (supernatural/super-experimental/empirical), Acts may rate 1 or 2, Revelation 9 or 10, but the 'fact' (be it past or future) we must consider to be true every time! Genesis sweeps majestically from the start of all things (10) to the death of Joseph (1). Along the way, the 'reality needle' may swing up and down the scale. But we must not let the supernatural detract from the historicity just because it is described by analogy rather than description, as if there were a lot of 'as ifs' assumed in the text.

[*Editorial comment:* the points made in Tim's letter have been slightly edited for clarity. Readers will observe from Phil's reply, that there is a large measure of agreement between them, but perhaps the correspondence will help to clarify any uncertainties others may have too. Certainly the editors feel that the original article is one of fundamental importance and we need to be clear on these issues.]

Phil Duce replies:

Behind Tim's comments I sense a measure of culture-shock with some of the content of my article! He is attempting to articulate valid and important points in his comments. I respond to his points in order.

1. I am not sure why Tim has commented on this point. He has identified a problem with her approach. Why is my mention (not defence!) of it contentious?
2. With respect to the reference to 'timeless' truth, I think that Tim is reacting more to a rejection of the word here, rather than the exposition. The term is slippery, which is why I think it should be avoided (although it is probably a common idea amongst 'the people in the pews'). The essential point is made by the reference to Carson in the article: we have no culture-free access to truth, nor can we express it in culture-free ways—but we can 'know the truth.' This point can be made without using problematic terms. We can use such terms, as long as we clarify what we mean, or do not mean! Thus, I will gladly affirm with Tim that biblical truth 'is expressed in different ways, at different times, to different cultures,' and is universally authoritative, relevant and applicable. To deny that biblical truth is 'timeless' is *not* to relativize it, which is what he fears.
3. As I state in the article, quoting Silva, *Scripture* is *not* relativized; our *interpretation* of Scripture is (or can be) relativized because we are weak, limited, ignorant and sinful. The point about the Holy Spirit is important. Let me borrow from the section on this in my book! Evangelical theology affirms a correlation between the rational process of biblical interpretation and the ministry

Continued on Page 26

Reader's Viewpoint

Richard H. Johnston

When is 'Not a Lion' a Lion?

> *And the wolf will dwell with the lamb,*
> *And the leopard will lie down with the kid.*
> *And the calf and the young lion and the fatling together;*
> *And a little boy will lead them.*
> *Also the cow and the bear will graze;*
> *Their young will lie down together;*
> *And the lion will eat straw like the ox.*
> *And the nursing child will play by the hole of the cobra,*
> *And the weaned child will put his hand on the viper's den.*
> *They will not hurt of destroy in all My holy mountain,*
> *For the earth will be full of the knowledge of the LORD*
> *As the waters cover the sea.* (Isaiah 11:6–9 NASB)

'The wolf and the lamb shall graze together, and the lion shall eat straw like the ox; and dust shall be the serpents food. They shall do no evil or harm in all My holy mountain,' says the LORD. (Isaiah 65:25, NASB)

THESE scriptures prophesy aspects of the future under the rule of the Messiah, upon Whom the Spirit of the Lord rests (Isaiah 11:2). He rules over the peoples, giving judgment in favour of the meek and slaying the wicked (11:4). During his rule, the animals have a restored relationship with each other and with mankind (11:6–9), comparable with the innocence of Eden. Isaiah depicts this transformed state of affairs as taking place upon the *earth* (Isaiah 11:9).

Isaiah 65:25 also has an earthly and, importantly, a temporal, context, being a part of a new heavens and new earth (65:17). Isaiah 65:20 places it in time, since death remains a present reality, although most people live to 100 years or more. The few who die young are presumed to be under God's curse. As in Isaiah 11, the animals are living in a renewed way.

What should we make of this? Should we assume that this is purely Isaiah's pictorial imagery vaguely suggestive of some coming world order? Or should we interpret it as referring to an eternal rather than a temporal context? The specific statements in Isaiah 65:20 about human death definitely seem to rule out eternity: if that were intended, it would have been easy to say, as Revelation does, that there was no more death. The admission that some people continue to die young—and are considered to be accursed—seems to place this passage firmly within the context of a world marred by the consequences of the Fall. In Isaiah 11, the emphasis on the earth, and the slaying of the wicked under the rule of the Messiah leads to the same conclusion. Isaiah foresees these events taking place on the present earth at some time before the final judgement.

But if we seek to interpret these passages *only* allegorically, denying that the passages refer to real animals, then given the earthly context, then there can surely be no animals of the kinds mentioned in such a kingdom.Otherwise these highly specific, detailed descriptions of the habits of these animals will be proved false. Since the context suggests human life is otherwise generally similar to that today, then it would seem strange if there were no animals we could recognise. The present earth without the animals is almost inconceivable. Thus it seems that Isaiah does envisage a real, terrestrial, Messianic kingdom that has animals of the recognisable kinds mentioned, living the life-styles described.

That being so, we must consider what changes have to happen to animals, like the lion, which are now so dangerous. The lion is going to lie down with the lamb, rather than eat it. Instead it will eat straw like the ox. This is so different from the lion behaviour otherwise recorded in Scripture, and which we know today, that we must examine the implications. We characterise the lion by its great strength, courage and its cunning, and highly organised team hunting of grazing animals. Most of the time lions are asleep, and the entire design of their bodies, their claws, their teeth, their digestive system as well as their behaviour patterns is designed to suit hunting and eating the animals they kill. The ox is quite different: it eats grass and must spend most of its time eating and chewing the cud simply to stay alive. For, unlike meat, grass is not very nutritious, so it must be eaten in huge quantities, and a highly specialised series of stomachs and grinding teeth are needed to process it. So quite apart from any changes in its behaviour and life-style, a straw-eating lion needs changes in body design. If we found a 'lion' with such great differences in its design and behaviour from normal lions, most people—certainly all zoologists—would conclude that it was a different animal. 'That's not a lion!,' we should say. But Isaiah tells us that a straw-eating lion is still a lion! The Messiah's rule as prophesied by Isaiah must achieve these huge changes from among the descendants of the present population of lions: anything else would be to form a new animal. What an enormous potential for variation within a single Biblical kind this implies!

If Isaiah prophesied this to happen on such a scale in the future, it should come as no surprise to discover that similarly massive changes occurred in the past.[1] Scripture tells us that the carnivorous animals were originally vegetarian (Genesis 1:30), and so their present characters represent equally major changes of body design and behaviour—in the opposite direction. Once again, judging by their appearance and habits, we almost certainly fail to recognise the original, vegetarian animals as being the ancestors of the carnivores. They would look so different, and be suited to a completely different life-style. Perhaps such large changes help to explain why there are so many extinct animal 'species' in the fossil record: at least some are probably the very different looking ancestors of today's familiar animals.

Since no creative acts are recorded in Scripture after the initial six days of creation (*i.e.* no new information is being supplied), it seems probable that all these various phenotypes were provided for in each animal's original genetic make-up. Although some of this variety has probably now been lost, Isaiah implies that the potential to return to the peaceful, herbivorous habits of Eden still lies dormant within the genetic information carried by lions. If the changes were under the control of genetic switches, triggered by changes in the environment or by subtle divine intervention, the switch from one phenotype to another could be immediate from one generation to the next.[2] There need be no intermediate forms: indeed it seems likely that only the fully-working, alternative phenotypes are viable.[3] Yet, despite the vast differences in appearance and life-style, each form is just a phenotypic expression of a single Biblical kind. The lions that Isaiah foresaw had not changed into oxen. Despite their physical changes, the lion will always remain a lion, though we may not realise this if we insist on judging by outward appearances.

Yes, they are still lions!

Notes

1. Compare Garner, P. 1998. It's a horse of course! A creationist view of phylogenetic change in the equid family. *Origins* 25:13–23.
2. As mentioned earlier, dentition changes would be needed for lions to live on a diet entirely of straw. In mice, some teeth can be changed from incisor to molar if subjected to certain chemical stimuli during a short critical stage of foetal development. This is just the kind of genetically switched change which would be needed. See Tucker, Abigail S., Matthews, Karen L., & Sharpe, Paul T., 1998. Transformation of Tooth Type Induced by Inhibition of BMP Signaling. *Science* 282:1136–1138.
3. It is worth reflecting on the life-cycle of the butterfly, whose entire body plan is transformed during pupation from the crawling caterpillar to the flying adult form. On the basis of outward appearance and behaviour, if we had never seen this transformation, or if we knew them only as fossils, we should conclude the caterpillar and adult butterfly were entirely different creatures. Did God in His wisdom provide such examples to show us just how very different an animal might appear at different times and circumstances, and yet be the same animal with constant genetic make-up?

THE AUTHOR

Richard Johnston holds a Ph.D. in mathematics, and devotes much of his time to biblical and Creation research, seeking to encourage a more critical and biblical approach to creationist scientific models. He has a website at http://members.aol.com/earthhist/

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Editorial note: We welcome this viewpoint from Richard, which reminds us of the connection between the Creation and the New Creation. However, we recognise that some readers may disagree with his eschatological position. *BCS* does not subscribe, as a society, to any specific position and we will not open up correspondence to a debate on the subject!

Continued from Page 24

of the Holy Spirit in leading and enlightening that process. The Holy Spirit works *through* human understanding and does not, therefore, short-circuit the problem of hermeneutics. However, because of the rationality of the process, the full significance of the Spirit's role has too often been neglected or omitted, both from textbook theory and in practice. Conversely, a simplistic appeal to the Spirit, in reaction to perceived or genuine self-reliant rationalism, is no substitute for sound interpretative methods. One textbook posits five commendable elements for proper interpretation and application: salvation, spiritual maturity, diligent study, common sense and logic; and humble dependence on the Spirit for discernment. Tim Constable appears to conflate Scriptural inerrancy with reliable interpretation, the very tendency I sought to warn against. As Jim Packer has pointed out, assertion of inerrancy does not guarantee the infallibility or inerrancy of any interpreter or interpretation. Compare my first paragraph in the article on inerrancy, quoting Silva. (Furthermore, how does Tim deal with the fact that godly, evangelical interpreters differ over such matters as baptism, spiritual gifts, eschatology, *etc.* Does one camp or another contain the 'bad guys' who are quenching the Spirit? I do not think so.)

4. I am not sure of Tim's point here with respect to my article. I think that he is saying that historicity need not imply a 'literal' description of 'facts,' but can involve analogy, metaphor, symbol, with which I concur. This is obviously relevant to the exegesis of Genesis 1–11 and other texts. However, I think that there is a confusion of some unhelpful or inappropriate categories in these comments. It is important that readers should study a good book on modern evangelical biblical interpretation to understand these issues.

Postscript.

The following two quotations may be found helpful in dealing with the issue of *timeless truth* as raised by our correspondent:

> 'Neither Judaism nor Christianity is Buddhism: we are not invited to an atemporal system of thought whose authority turns on the credibility and æsthetics of an abstract philosophical system. We are instead invited to the personal-transcendent Creator-God who deigns to address his rebellious image-bearers in "the scandal of [historical] particularity."
>
> 'Precisely because God's self-disclosure has taken place over time, NT theology, as part of the larger discipline of biblical theology, is committed to understanding the constitutive documents within that temporal framework. In this respect NT theology differs widely in emphasis from systematic theology, which tends to ask atemporal questions of the biblical texts, thereby eliciting atemporal answers. ... NT theology is committed to inductive study of the texts. The texts are not first and foremost a quarry for abstract doctrines or the source of answers to questions they are at best only marginally interested in addressing but are texts that demand study on their own terms ... Thus at its best biblical theology has the potential for reforming dogmatics.' [D. A. Carson, 'New Testament Theology,' in R. P. Martin and P. H. Davids (eds), *Dictionary of the Later New Testament and its Developments* (Leicester: IVP, 1997), pp.807, 808.]
>
> '... Christianity is unique among the world's religions. Other religions only seek to communicate eternal truths, doctrines, and ethical principles that are true apart from the occurrence or nonoccurrence of any historical event. Christianity also teaches some eternal truths (the existence of God, His attributes, His trinitarian nature, *etc.*), but it is focussed on the historical events of Jesus' incarnation, death, resurrection, and ascension and the coming of the Spirit at Pentecost. Inevitably, therefore, Christianity is involved with history.' [J. M. Frame, *The Doctrine of the Knowledge of God* (Phillipsburg: Presbyterian and Reformed, 1987), p.302.]

Reviews

From Flood to Pharaoh—a chronological framework, by Steven J. Robinson. The Genesis Agendum Occasional Paper 2. 1998. 12pp.

From Flood to Pharaoh—understanding the Old Stone Age, by Steven J. Robinson. The Genesis Agendum Occasional Paper 3. 1998. 12pp.

Reviewed by Paul Garner and John Peet

THE STATED aim of the Occasional Papers issued by The Genesis Agendum is to 'provide a forum to disseminate constructive discussion and the results of recent study and research demonstrating the accuracy of the Bible.' These two papers are an attractive and valuable contribution to the series. They represent the culmination of Steven Robinson's efforts to find a chronological framework that reconciles the data of Genesis on the one hand and the data of geology, palæontology and archæology on the other. As I feel inadequate to the task of commenting on Steven's archæological arguments, I [PG] will concentrate on the geological aspects of the first monograph and John Peet will review the archæological and anthropological aspects of Steven's proposed synthesis.

The first monograph, *From Flood to Pharaoh—a chronological framework*, is an attempt to match up the sequence of events in Genesis 7–12 with the geological and archæological record. The Hadean (conventionally 4.6 to 3.8 billion years ago) is identified with the first 40 days of the Flood, the Archæan (3.8 to 2.5 billion years ago) with the total inundation of the Earth, the Proterozoic (2.5 to 0.54 billion years ago) with the emergence of new land during and after the Flood, and the Phanerozoic (0.54 billion years ago to the present day) with gradual ecological recovery. As we cross over into the realm of archæology, the dispersion from Babel is said to correspond with the immigrations into Palestine during the late Chalcolithic (from *c*.3800 BC) and into Egypt during Naqada II (from *c*.3500 BC). The second of the papers then applies a test of the short time scale proposed by Steven.

This model is a further development of Steven's ideas since he published his paper, *Can Flood geology explain the fossil record?* (Robinson, 1996). In that paper, Steven argued that the Flood began in the Proterozoic and ended in the Upper Palæozoic. It is clear that his thinking has moved on in the last two years. Perhaps of particular interest is Steven's thinking about the Precambrian. The Precambrian is something of an enigma to creationists and non-creationists alike. For a long time, the Precambrian was considered devoid of fossils, and separated from the subsequent Phanerozoic (*i.e.*, Cambrian to Recent) by a worldwide erosive unconformity. Creationists borrowed this description and usually assigned the Precambrian to the Creation Week. However, neither statement about the Precambrian stands up any longer. It is now incorrect to say that there are no undisputed Precambrian fossils. As Snelling (1991, p.156) has pointed out:

> '... there is now abundant evidence that rocks which evolutionist geologists classify as Precambrian do in fact contain a variety of fossils...The most significant of

> these Precambrian fossils are microscopic algæ and megascopic stromatolites, the latter being the layered structures formed as a result of the accretion of fine grains of sediment by matted colonies of micro-organisms, principally algæ.'

We also know today that there is a widely distributed metazoan fauna (*i.e.*, multicellular animals) in the Late Precambrian. Several thousand specimens assigned to more than 100 species have been found (Fedonkin, 1990, p.17). The Precambrian is more richly fossiliferous than anyone would have believed twenty-five years ago, when geologist Preston Cloud expressed his view that no records of unequivocal metazoa had yet been found in undoubted Precambrian rocks (Gish, 1979, p.68). Neither is it thought any longer that there is a worldwide unconformity separating the Precambrian from the Phanerozoic. McMenamin (1987, p.88) says:

> 'In the 19th century the boundary between the Precambrian and the Cambrian was relatively easy to find, because the areas then under study showed major gaps or unconformities (representing an interval of time in which there was no preservation or deposition of rocks) between Precambrian and Cambrian sedimentary layers. The expanded data base available to 20th century paleontologists has actually complicated the task of locating the boundary precisely, because many regions are now known where Precambrian and Cambrian formations grade continuously into each other.'

Considerations such as these have compelled some creationists to re-evaluate the Precambrian and propose that much of it was formed during the Flood (Hunter, 1992; Hunter, 1996; Snelling, 1991). However, for traditional Flood geology models this poses a huge problem. How did thousands of feet of Precambrian strata, with their peculiar fossils, come to be laid down before all the Phanerozoic layers were deposited on top? If the Phanerozoic animals are a pre-Flood fauna buried during the Flood, where were they all while the Precambrian was being laid down? If the entire fossil-bearing succession from Precambrian to Cenozoic represents the gradual overwhelming of pre-Flood environments by the waters of the Deluge, then what environment does the Precambrian represent? In the words of Michael Oard (1992, p.94):

> 'It is hard for me to envisage a burial environment in the Flood that entombed only algæ and bacteria.'

Steven's solution is that the fossil sequence through the Precambrian and across the Precambrian–Cambrian boundary is an ecological succession representing recovery of the biosphere after the first 40 days of the Flood. Let me briefly outline his hypothesis, as I understand it. The impact craters of the Moon and the terrestrial planets testify to a heavy meteoritic bombardment in the distant past that must have simultaneously affected the Earth. That most of the craters were produced in a short-lived, one-time event is suggested by their asymmetrical distribution on the surface of these planetary bodies (Steidl, 1979, pp.72–7). It seems logical to conclude that the solar system received this bombardment at the time of the Flood; it is difficult to see where else in the biblical framework it can fit. This bombardment was so intense that it would have melted the pre-Flood crust. All the terrestrial air-breathers, except those on the Ark, and the bulk of the marine fauna, would have been blotted out. According to Steven, this episode is represented in the geological record by the Hadean (conventionally 4.6 to 3.8 billion years ago). As the bombardment came to an end, the first organisms to appear in the fossil record would be hyperthermophilic (*i.e.* heat-loving) bacteria, like those found today around deep-sea hydrothermal vents. These are the fossil micro-organisms that characterise the Archæan (conventionally 3.8 to 2.5 billion years ago). Conditions were still too hostile for other types of organisms to thrive in sufficient numbers to be fossilised. Only as the global ocean cooled, and the waters became more oxygenated, would photosynthetic bacteria begin to appear. This corresponds to the uppermost Archæan and earliest Proterozoic. In the mid-Proterozoic, the first trace fossils of marine worms and other animals appear, and then the earliest metazoans in sediments conventionally dated to about 600 million years ago. Then in the Lower Cambrian we see the sudden explosion of marine life, representing a range of body-plans unequalled in today's oceans. Steven interprets 'the Cambrian explosion' as the exponential increase of organisms radiating into a post-Flood world of unlimited ecological opportunity. On page 3 of the monograph, Steven summarises his proposed model:

> 'What we find is evidence not of amazingly complex forms of life evolving from less complex forms, but of conditions in the waters around the continents reaching, world-wide, a point where comparatively normal communities of marine fauna could colonise those environments. The succession from bacteria, to algæ, to worms, to the enigmatic Late Proterozoic fauna, to sponges, lingulid brachiopods, trilobites, and so on, is best understood as an ecological succession, as temperatures on the marine platforms fell and dissolved oxygen levels correspondingly rose. In view of the preceding stromatolites, which must have taken weeks or months to form and thus severely constrain attributable rates of sedimentation, the Cambrian climax may represent a period already several years after the Flood.'

This is undoubtedly a radical departure from the creationist thinking of the past, and for that reason alone some will want to dismiss this hypothesis out of hand. However, the fact that Steven's ideas are radical is not a sufficient reason to reject them. Whether Steven's ideas are on the right lines or not, these papers are an important contribution to creationist thinking on earth history. If they only provoke further thought and debate, and compel Steven's critics to articulate the biblical and scientific reasons why they disagree with him, then these papers will have served a valuable purpose. And, of course, if Steven's model approximates reality, then we will have even more reason to be grateful to him for these contributions.

Young earth creationists have been challenged for a long time to correlate their (biblical) chronology with geology and archæology (Peet, 1995a-c; 1997). If the

Precambrian corresponds to the period of Noah's confinement to the ark and the earth's recovery from the Flood, how can we correlate subsequent geological strata (some 500 million years on the conventional timescale) with a period of approximately five thousand years? Archæological history is essentially the history of man. Can the time period be condensed in this way? That is the objective of Steven's second paper, *From Flood to Pharaoh—understanding the Old Stone Age*.

The writer begins by comparing the conventional timescale with that proposed by his model (see the table). He then plots this data producing a smooth curved graph showing a possible correlation between the two timescales. The graph could be misleading as it shows only the first few hundred years following the Flood due to the constraints of the scale. Technically, one must query the smooth curve relationship from these points—it is a hypothetical correlation, but it is difficult to test its mathematical validity. However, as a principle it is certainly a valid idea. It fits the general pattern of Steven's theory. As he has commented, no other Flood model has the potential to make any sense of radiometric dating. It accepts the relativity of the radiometric ages of the rocks but interprets them in a creationist context. The mechanism by which this reduction in radioactivity occurs is still the subject of debate.

Geological periods	Conventional length	Biblical correlation
Hadean	800 Ma	40 days
Archæan	1300 Ma	110 days
Proterozoic	2000 Ma	2–10 years
Phanerozoic	540 Ma	2000 years

To test his hypothesis, Steven makes two predictions: there is a 'filling up' of the Stone Age as human beings, continuing to multiply, left more of an archæological record; the evidence should indicate that the period is brief, measurable in hundreds rather than thousands of years.

Steven proceeds to challenge conventional ideas once again. It is generally believed that Noah and his descendants landed on Mount Ararat in Turkey. This is based, of course, on the modern name of that mountain. It is not the historic location of the landing. Others have challenged this location in recent years, but Steven reviews the archæological evidence. The earliest evidence of man's presence is in Africa and, at this time, modern Ararat was a volcano. Further, the continent was isolated by surrounding seas, preventing migration from it or to it from other continents. Human remains occur much later on the other continents.

Looking at human anatomy, Steven shows that there is a variation—and, indeed, a correlation—between the different body shapes and environment. These variations in humans also relate to the arrival of successive newcomers to the other continents.

A further important factor in the author's hypothesis relates to the number of Palæolithic (Old Stone Age) sites over the conventionally assigned millenia. The rate of growth in these is far below that which would be predicted on the basis of human reproduction rates. Again, there is a poor correlation between the development of stone tools and the growth in brain size. As he puts it, 'the result [is] of cultural, not cerebral, evolution.'

Steven proposes, then, that there is a lack of evidence for an evolutionary timescale and it fits better with the biblical account of the growth and spread from one family a few thousand years ago.

There is a mass of information in this monograph and it needs—and deserves—reading through several times. While some will not like Steven's model, it is clear to me that he has made a case that is difficult to challenge. The Stone Age evidence only favours large timescales if we start with evolutionary assumptions. Radiometric techniques are of limited value as a means of direct dating of these ages.

If we start with the biblical implications that man was intelligent and creative from the beginning of Creation (and so from the Flood), then it is difficult to see how the timescale of cultural development could not have been short. Steven shows that the material evidence is consistent with this.

Once this contraction of archæological time is accepted, we can move backwards and ask if the correlation in his key Figure 1 is reasonable. Anyone interested in the time factor in the creationist/evolutionist debate should read these papers.

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A Drama of Creation : the Genesis record and the fossil record, by Alan Fowler. Ortho Books, Bridgend. 1996. 105 pages. ISBN 0 9529114 0 X. Price unknown.

Reviewed by J. H. John Peet

Mr. Fowler is dissatisfied with the various views of the relationship between the Bible and science in viewing the origin of life. He favours an old earth creation model though the reader at times may wonder if he is favouring evolution rather than creation. He opposes a literal interpretation of these Scriptures (p.13). He fails to face up to the implications of taking on a non-literal interpretation of these passages. So much of the New Testament is based on these as historical records. Many doctrines and teachings have their foundations in these chapters. Any argument for a non-literal position must take these issues into account.

Fowler claims that it is universally agreed that Genesis 1 is not poetry. This surprised the reviewer who still hears this claim. The author says that the usual conclusion is that it must, therefore, be prose. He, on the other hand, suggests that there is a third way: drama. In order to substantiate his claim that this is drama, Fowler explores other examples of drama in Scripture. The reader may well be surprised at the examples chosen, which seem to be based on assumption rather than evidence. For example, we are told that Job is a play based on a true story with a strong moral lesson! Similarly, the account of Christ's temptation was a drama (pp.26–27). The key factor here seems to be that a forty day event is condensed into a few sentences.

So, he concludes, the creation account is drama: it is a short account of an event that took long ages. I find the case unproven in that his so-called evidence would be equally applicable to a historical account. He argues that there are many non-literal examples in Scripture, which no-one denies as far as I am aware. But, it does not prove that Genesis 1–11 is one of these non-literal cases. It has been recognised by many scholars that there is no difference in literary form between these chapters of Genesis and those that follow.

Perhaps as a result of his presuppositions, we are presented with some very sketchy and faulty examples of exegesis. For example, the days of creation are dismissed as chronological events because they are thematic. The basis of this conclusion is that the first three days and the second three are parallel! I fail to see the logic in this argument. His analysis of man being in the image of God is very brief. There has been no attempt to interact with the extensive exegetical literature on this subject. We see this faulty exegesis again when he refers to Genesis 14 where we are told that it 'appears to be telling us that Melchizedek had no father, no mother, no beginnings and no end.' It does not say anything of the sort! The parallel with Genesis 1 is that both are historical!

Inevitably, of course, when one argues against the literal interpretation of the Creation account, one is faced with the problem of accounting for the origin of man. The Bible makes it plain that God created man uniquely. He did it directly, not just by the word of His mouth. Man was/is unique in his nature because he has a special relationship with God. Like the theistic evolutionists, Fowler has to resort to the Neolithic Revolution as the source of man: God transforming a pre-Adamic being into man. Indeed, he identifies Neanderthal man as one of the pre-Adamic races. Once again we are presented with inadequate research. The writer seems to be very confused and even self-contradictory in his comments on the fossil record. He says that the 'fossil record must provide the best scientific evidence' for evolution (p.39). But Dr. Mark Ridley, an evolutionist, said several years ago that this had never been a claim of the evolutionist. S. J. Gould has also commented on its inadequacy as a historical record. Later on (p.59), Fowler quotes Ager against the fossil record being a record of earth history.

The author believes that the fossil record reveals successive creation events over vast periods of geological time (p.19). But this cannot be correlated with Scripture whether we take a literal or non-literal interpretation. The Genesis record of Creation is one of life, harmony, beauty, *etc.* When we turn to the fossil record we are looking at death, agony, destruction. One is about Creation; the other is about judgment.

In chapter 13, Fowler challenges the concept of a global Flood and the relationship of this to the fossil formations. He questions the concept of the universality of the Flood, but I am left with a problem. How could God have made it more plain than He did that the Flood was universal? The use of words such as 'all' and 'everywhere,' the reference to the waters covering the high mountains, the provision of an ark (when Noah could have been transported to dry land elsewhere), and so on. All indicate that God meant what He said. And why take the animals on the boat? Geologically we must also believe in a universal Flood (or at least floods)—after all, the earlier geological layers are global!

In arguing for vast ages of time, he quotes Wonderly's comments on the slow growth of coral. The claims of this worker have been reported and disputed in this journal. In fact, Fowler makes no attempt to face the contrary evidence on the timescale proposed in this and other creationist journals. This, in fact, seems to be a major weakness of this book. It does not tackle the substantial research work done by christian believers on this subject. Rather, the work of unbelievers (and some christians) is taken as the sole basis of his arguments.

In summary, this book seems to be based on a faulty exegesis of Scripture and so fails to demonstrate his thesis. There is an inadequate understanding of geology and a failure, as a result, to comprehend its relationship to Scripture. I am amazed at his conclusion (p.99) that the barrier for evolutionists (to believing in biblical Creation) is young earth creationism. It seems to me that the Scripture has a different diagnosis of their blindness.

Eight Questions for the Christian Evolutionist

J. H. John Peet

REGULAR readers will know that an anti-evolution stance puts us at variance with most of the scientific community and with those of our evangelical brethren who hold the evolutionary model to be valid. Biblical creationists are unkindly written off with 'flat-earthers' and anti-intellectuals by their evolutionist brethren. Christian evolutionists feel disturbed at the implication that they do not believe in creation, claiming that God created by evolution.

Biblical creationists (as distinct from the scientific creationists) believe that our understanding of origins must be based firstly on biblical revelation, expounding it according to its own well-established exegetical rules. Science, within its own well-defined limitations, can play a role in our application of these.

The Christian evolutionist gives priority to the currently accepted scientific theory, tempered to some extent by his evangelical position. He sees Genesis as a 'disguised version of the past which the scientist can discover' (Mackay, 1960). Both sides may go to extremes and both should listen to the other, not only to hear correctly what the other side says, but also to search out their own positions to ensure that the guiding factor is not human prejudice.

Often our Christian evolutionist brethren accuse biblical creationists of falling into a 'God of the gaps' mentality. If we cannot explain something scientifically, we call in the miraculous, they say. This is both unfair and illogical. In fact, Christian evolutionists fall into the trap themselves. They assume (and it is an assumption) that everything is explicable mechanistically. However, it is generally believed among them that God intervened at the Neolithic Revolution to convert a hominid to man. Is that not a God-of-the-gaps approach?

As creationists, we believe that God is involved as Creator and Sustainer in all parts of His creation. We also believe that, if the Bible is true, we should be able to test it at some points (even if not in the processes). For example, Genesis 1 clearly teaches that God planned and designed the world. So, we have the right to ask whether the world demonstrates design. We believe that it does; we are not calling in God to explain the scientifically inexplicable. We see the natural consequence of biblical claims—and contrary to the evolutionary hypothesis.

While the creationist has hard questions to answer in the scientific arena (though, we believe, less hard in quality and quantity than his evolutionary counterpart), the theological implications for the evolutionist are more far-reaching and must be faced. We wish to raise some questions for those brethren who disagree with us. Many of them will stand uncompromisingly on some of these points, but there are deviations by some—and we are concerned lest these have a leavening effect.

The Christian evolutionist believes in complementarianism, which tries to hold creation and evolution in separate or complementary compartments. But eventually they have to meet—and clash head on! We pose some questions for their consideration.

ART APPEAL

Much time is spent digging for illustrations for Origins and sadly we often fail (for example we were unable to find a picture of Adam and Eve at work in time for the last issue).
We are sure that we have some gifted Members who would be keen to help by producing the occasional non-technical drawing in our times of need.
Our Editors would be most pleased to hear from anyone prepared to help on an occasional basis.

Question 1: **If you accept Scripture as infallible and inerrant, do you accept the historicity of Adam and Eve?**

I believe most Christian evolutionists (though definitely not all) would say 'Yes.' After all, Romans 5 would lose its 'punch' (to put it mildly) if Adam were not real. However, this answer is usually followed by a 'But...' Almost exclusively Adam is seen as an evolved hominid whose 'special creation' was a spirit implanted by God. Consequently, in their view, man's body cannot be said to partake in the image of God. Man, physically at least, is not a special creation as stated in the Genesis account. Woman could not have been created specially from man, so undermining the New Testament arguments on the role-relationships of man and woman which are clearly based on the historicity of the Creation account (Keddie, 1983).

The second question follows from this ...

Question 2: **Do you deny that the whole man was made in the image of God?**

Usually the evolutionist limits this to the 'spiritual' side of man, other 'natural' characteristics being the result of his evolution. Is this biblical? The evolutionist would try to challenge the creationist position that man in his entirety is in God's image by saying that this implies that God has a body. Man's body is the means by which the invisible features of God are made manifest in man (Peet, 1989). We read, for example, of God seeing, hearing, speaking, *etc.*; our organs (eyes, ears, mouth, *etc.*) are the means of displaying the same abilities in man. The Christian evolutionist would argue that such language about God is anthropomorphic and respects an accommodation to the human knowledge. This position needs to be justified from Scripture and loses it strength when we have to determine the limit to such anthropomorphisms. For example, we all understand that God loves. Our love is a reflection of that love. We are in the image of God, not *vice versa*. We also remember that 'in Christ dwelt the fullness of the Godhead bodily.' He was truly man and truly God. As someone has expressed it, when God created man, He designed man to be a fit vehicle so that God could come to earth as a man and demonstrate the glory of God.

Question 3: **Do you deny that human physical death was the result of the Fall?**

'The Bible's teaching about the Fall, sin and death provides perhaps the greatest difficulty for the complementarist approach,' says Keddie. The doctrine of the Fall, so fundamental to the doctrine of salvation, depends on death as the consequence of man's rebellion.

Studying the teaching of all the Scriptures on death (and not just the 'creation passages'), Watts (1983) shows that the death referred to at the Fall was not only a spiritual death, but also physical death (see also Duce, 1999). The Christian evolutionist, in contrast, says that spiritual death alone was the judgment for the Fall. But God makes it plain (Genesis 3:19) that, as a punishment for his sin, man, who came from dust, would return to it. That can only be interpreted physically and is meaningless in a Christian evolutionist context. If the 'dust' from which Adam was made was a hominid, then what is the dust to which we shall return when we die? Only the special creation of man from literal dust of the ground fits and makes sense!

If the hominids had been suffering the pains of gardening, *etc.* for hundreds of thousands of years, what is the significance of the other judgments (Genesis 3:17–18). Further, it renders the divine claim that the creation was 'very good' at best meaningless. The evolutionary scenario with the extinction of 90% of species is in contradiction of this.

Romans 8 and 1 Corinthians 15 especially make this connection inescapable. Liberal theologians agree that Paul claims this, though they think Paul is wrong. A belief in the evolution of man logically requires a belief in the presence of physical death in man before the Fall. A rejection of the connection also means a rejection of any historical meaning to Genesis 5. If man was an evolved hominid, then such large ages would not be natural.

Surely the effects of the implantation of physical death are apparent in that *(a)* even after a ripe old age it is said of everyone, except Enoch, 'and he died'; and *(b)* the age span in Genesis 11 gradually reduces, eventually reaching the 'three score years and ten.'

There is a more subtle and dangerous trap for those who deny that the physical death of Adam was the result of sin (and some have fallen into this trap too) ...

Question 4: **Do you deny that Christ's physical death was a necessary part of the atonement?**

'Christ died for our sins,' says Scripture. The Scriptures tie Christ's death to man's death because of sin. To break this connection with physical death is to undermine Paul's arguments and the whole sacrificial system of the Old Covenant. No wonder a liberal theologian and contemporary of Darwin wrote, 'Evolution is now approaching the citadel of our Christian faith. It is affecting Soteriology and Christology.' Evangelicals should be cautious.

Phil Duce, in this issue, emphasises that Paul uses the physical death of the body with its antithesis of the resurrection of the body.

Nigel Cameron, in his book *Evolution and the Authority of the Bible*, shows that there is an inevitable disharmony between the Bible and evolution at this point. Cameron concludes that 'Scripture... carefully and definitely makes a separation between God and the entry of evil into His creation.'

This too raises important questions ...

Question 5: **Do you deny that the creation was perfect?**

The Christian evolutionist has to accept that creation, before the Fall, was imperfect from the beginning. As a result, God's verdict in Genesis 1:31 has to be reinterpreted to mean something less than He said. For example, it has been claimed by them that death is actually something good. But, when we read the Scriptures, we find such comments as 'the last enemy to be destroyed is death' (1 Corinthians 15:26). It would be a profitable study to see what, in Scripture, God describes as 'good.' Since Scripture is God's revelation to man, and He is the perfect communicator, why then did He not use unambiguous human words?

Cameron (1983) points out that there had to be a time of innocence between man's creation (whether special or evolutionary) and his Fall for there to be any meaning (literal or symbolic) to the entry of sin in Genesis 3. If not fallen, says Cameron, man could not be under the curse and its consequences. But, for the Christian evolutionist, these already existed!

Question 6: **Do you deny that creation was/ is complete?**

In what sense did God cease creation (Genesis 2:1–2), if evolution, in its popular sense, is still going on? Whatever interpretation of Genesis 1 is applied, it must be consistent with a completed creation (though, of course, the Bible does speak of limited, specific, miraculous interventions in history—*e.g.* the effects of the Fall, the preparation of the great fish for Jonah, *etc.*) and God ceasing from this activity on the seventh day. Again, this is tied to the Jewish sabbath and the Christian's ultimate rest. Too many 'babies' have to be thrown out with this 'bath water.'

Question 7: **Do you deny a distinction between the miraculous and providence?**

The problem is tackled by Prof. Andrews in his book *God, Science and Evolution*. To relegate creation to the process of evolution is to do just this.

Colossians 1:15–17 distinguishes between the two divine activities. As Tyler (1983) shows, this has important implications for our discussion on origins. If creation is miraculous, then mechanistic science cannot investigate it—no more than it can research the resurrection of Christ or the new birth or predict Christ's return.

Question 8: **Do you deny that Scripture must be normative in all areas of life, including our practice and interpretation of science?**

It has been a long-held belief of conservative evangelicals that the Scriptures are normative. We have judged human ideas against Scriptural principles. We have held the Bible to be infallible and inerrant. We have allowed for different modes of communication (historical, poetic, *etc.*), but have agreed that this must be determined on internal evidence. We have resisted the desire of liberals and humanists to rewrite Scripture to fit the current thinking, whether academic or political. While we have been grateful for the insights of scholars in other fields, we have evaluated them against Scripture.

It does seem to us that our Christian evolutionist brethren have exempted this area of science from this basic principle of the understanding of the Scriptures. We would all agree that 'science' is the product of the thinking and research of those who are engaged in those areas of knowledge that fit into the criteria historically established as scientific. As the product of human thinking—and many of us in BCS are active scientists—we recognise that it is inevitably fallible. Scripture must determine the way we think and challenge the ideas and morality of what we do. So we consider the ideas of evolutionists as subject to Scripture too, yet it is here we find basic areas of historical and theological conflict. We know our Christian evolutionist friends would reject 'evolutionism' on these grounds, but believe the problems can be extended to the areas of macroevolution which are unsubstantiated.

We urge our evolutionist brethren to consider their position in the light of these questions.

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STOP PRESS

The skeleton of a four year old boy has been found in the Lapedo Valley, near Leira, 90 miles north of Lisbon showing the characteristics of *Homo sapiens* and Neanderthals. The anthropologist, Erik Trinkaus, believes that the it shows that the two human groups interbred. This is in keeping with the creationist approach, which predicts the possibility of such hybrids. It also refutes the models of human origins that predict that humans emerged from Africa and wiped out the Neanderthals.

What really happened to the Peppered Moth?

The Peppered Moth, *biston betularia*, has been a popular 'proof' of evolutionary theory. Creationists have disputed that this was any more than an example of natural selection. Now the work of Bernard Kettlewell has been put under the microscope and found wanting. Michael Majerus has disputed Kettlewell's claims. The moths do not normally rest on tree trunks as shown in his photographs (dead moths were placed there by the reseracher.) Nor was there selective removal of either form to the degree claimed by Kettlwell. Another evolution expert, Professor Jerry Coyne, said that the original experiments are essentially useless.

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